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# AIR BRAKE.

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SUPPLEMENT TO

## “THE SCIENCE OF RAILWAYS”

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BY  
MARSHALL MONROE KIRKMAN.

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PUBLISHED BY THE  
WORLD RAILWAY PUBLISHING COMPANY,  
ILLUSTRATING  
AND EXPLAINING THE WORKINGS OF THE  
AIR BRAKE.

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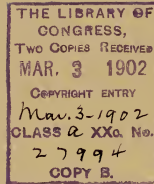
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# THE AIR BRAKE.



## THE AIR BRAKE AND ITS WORKINGS.

The vast and unexampled use of the Air Brake makes a clear knowledge of it of vital importance to every one actively interested in the movement of trains. In order to bring this about more fully, I have prepared, as a supplement to "THE SCIENCE OF RAILWAYS" the accompanying plates and descriptive matter, illustrating and explaining the WESTINGHOUSE QUICK ACTION AUTOMATIC BRAKE APPARATUS.

It embraces the latest improved appliances and such as the Westinghouse Company includes under that head.

The diagrams, therefore, will be found especially interesting and valuable to all who have occasion to use or make a study of such matters.

Nothing could be more clear than the cuts and the explanations that accompany them, as they have in the main been prepared under the immediate eye of the Westinghouse Company.

The rapid increase in the use of the "High-Speed Brake" in fast express service, and the favorable results obtained in handling heavy trains on mountain grades by the employment of the High-Pressure Control Apparatus (Plate G 49) lend especial interest to the accompanying illustrations of these devices, to which the attention

of the student in such matters is especially directed.

Attention is also directed to Plate G 1 which illustrates the entire brake, and to the colored Plates, G 2, G 3 and G 35, which show the application of the various parts of the apparatus to the engine, tender and cars. The cuts that follow show, in detail, the various parts which go to make up the complete machine.

In addition to the air brake the TRAIN AIR SIGNAL APPARATUS is also portrayed herein. See Plate F 33.

A carefully prepared index will be found on pages 5 and 6.

In Volume 1, Chapter 6, of the "Science of Railways," the evolution of the brake is illustrated, followed by a carefully prepared account, with attendant cuts of the air brake and its construction and management. It is again referred to with considerable particularity in Volumes 4 and 12 of the same work. This supplement, I beg to state, is not intended to supersede what is said in the "Science of Railways" in regard to the air brake, but to be auxiliary thereto, for the better elucidation of this very complex and important feature in the operation of trains and in the mechanical department of railroads.

M. M. KIRKMAN.

# RULES REGARDING THE OPERATION OF THE AIR BRAKE.

Information and rules on the following points will be found in the "Science of Railways," in the volumes and at the pages indicated:

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PLATE G 1.

Diagrammatic Illustration of the Westinghouse  
Quick-Action Automatic Brake.—*Opposite.*

PLATE G 2.

Westinghouse-American Locomotive and Tender  
Equipment.—*Opposite.*

PLATE G 3.

Westinghouse Standard Passenger Car Brake and  
Signal Equipment.—*Opposite.*



SEMAPHORE  
GAUGE

COP



SERVICE  
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EQUALIZING RESI

OUT COCK

MA

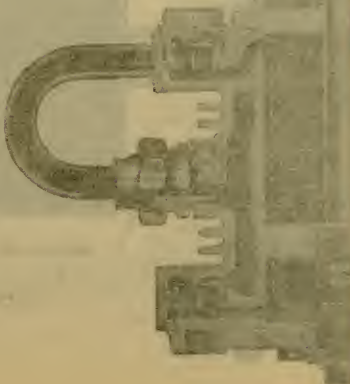


DRAIN COCK

ENGIN

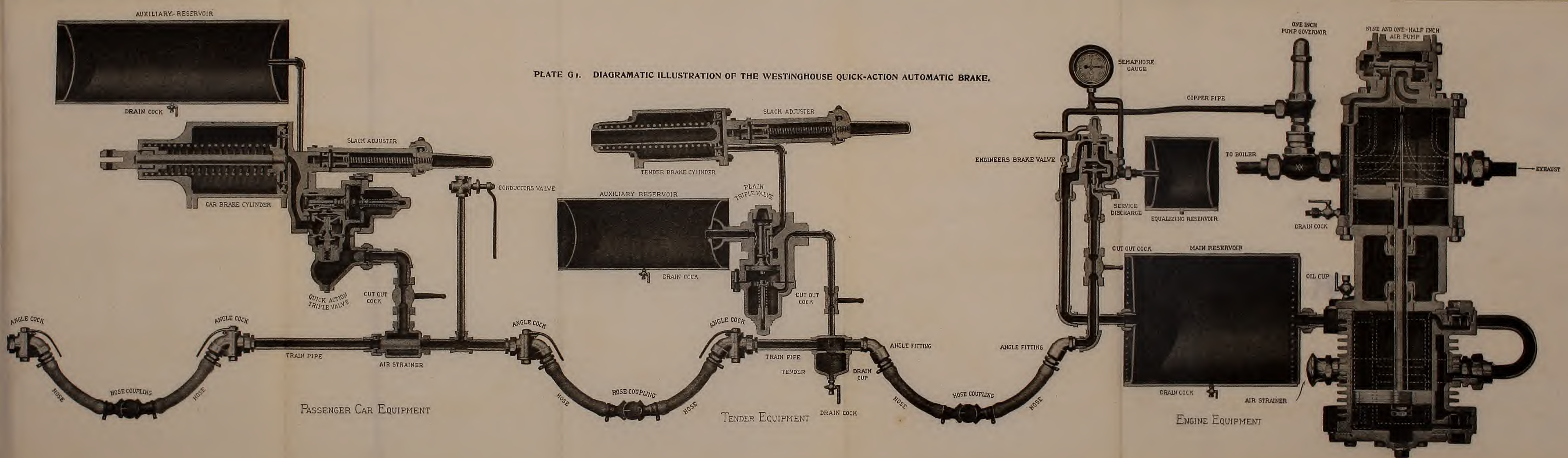
TRUANT

ONE-THIRD INCH  
SCALE

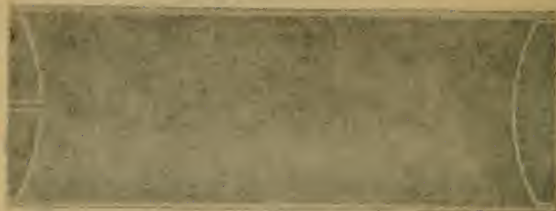






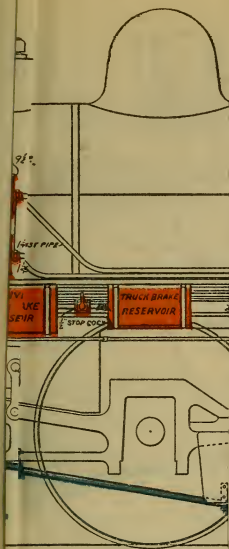




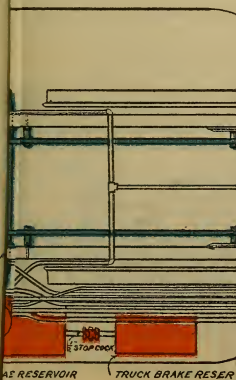


DRAIN COCK





P, AND LEVERS ILLUSTRATED ARE M. C  
 WERE PRACTICABLE TO EMPLOY BENDS  
 F WY CLAMPS. USE NO LEAD INSIDE C  
 SU COPPER PIPES ARE RECOMMENDED

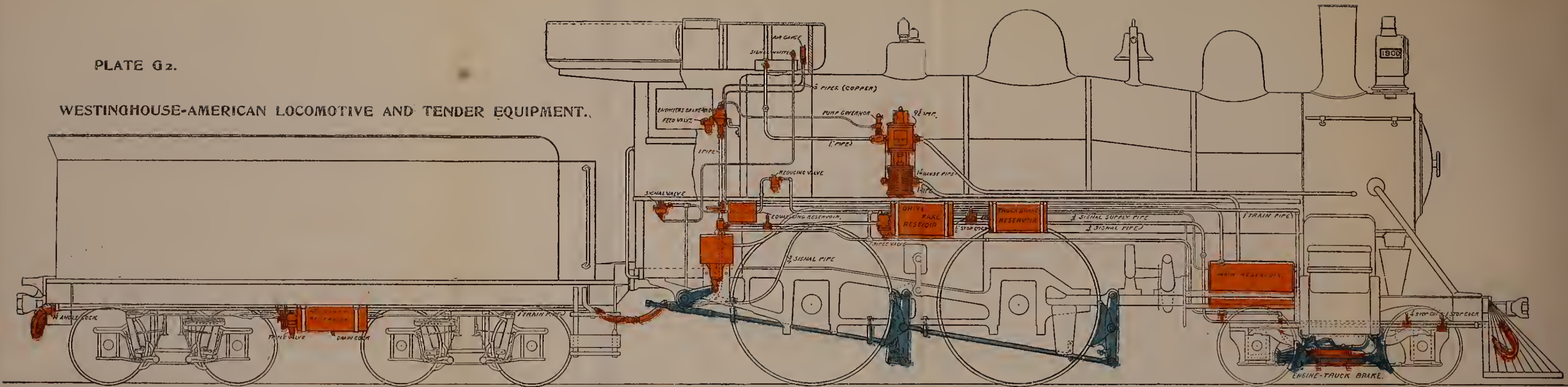


2. Use 1/2 inch pipe for  
 1/2 inch pipe for  
 1/2 inch pipe for





WESTINGHOUSE-AMERICAN LOCOMOTIVE AND TENDER EQUIPMENT.

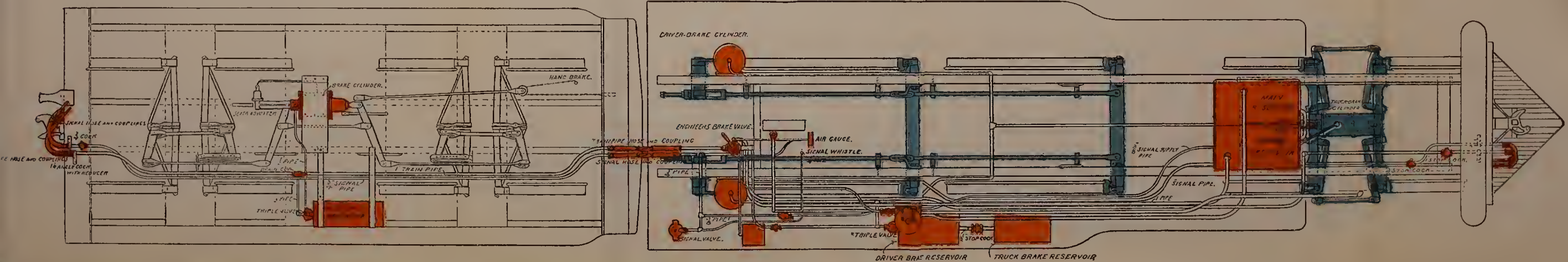


EXPLANATION OF TINTS.

WESTINGHOUSE Automatic Brake and Train Air-Signal Apparatus shown in Orange Tint.  
AMERICAN Driver Brake, Engine-Truck Brake and Automatic Slack Adjuster shown in Blue Tint.

IMPORTANT SUGGESTIONS.

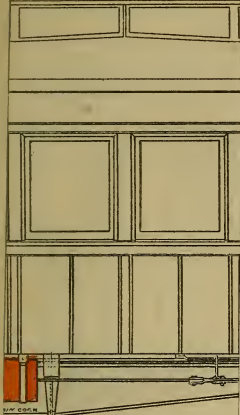
ALL brake rods, PS, and levers illustrated are M. C. B. STANDARD SIZES, and no deviation therefrom should be permitted. In piping, ELLS should not be used where practicable to employ BENDS instead. Remove fins carefully, blow out pipes with steam, and attach firmly to car timbers by means of EASY CLAMPS. Use no lead inside of sockets; if needed, apply sparingly on outside, and test all connections under pressure with soap-suds. Copper pipes are recommended for Air-Gauge and Pump-Governor connections.



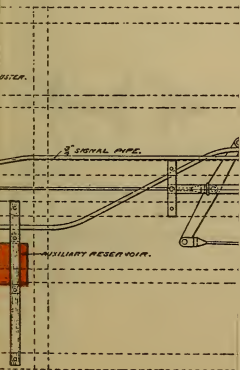




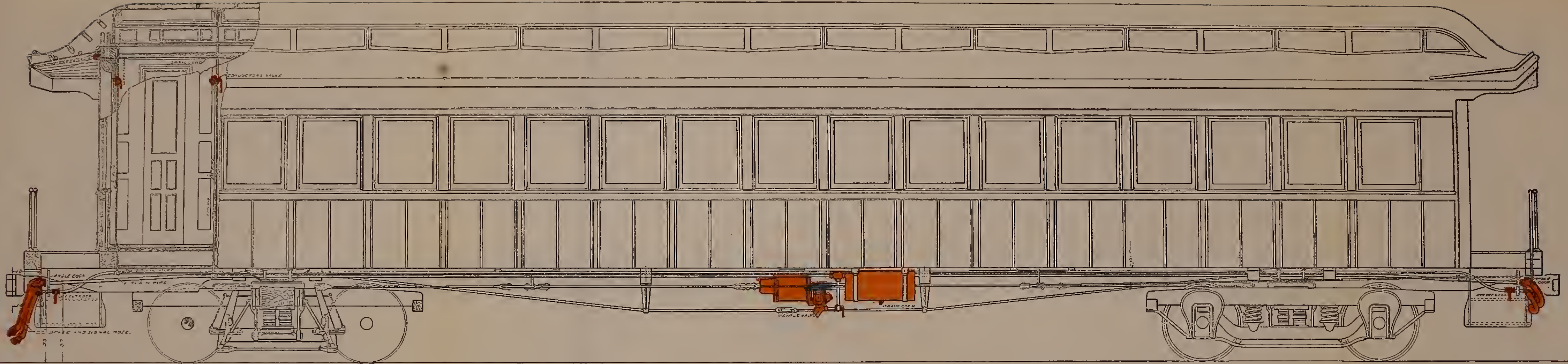
# BRAKE AND SIGNAL E



BRAKE RODS, PINS, AND LEVERS ILLUSTRATED  
 NOT BE USED WHERE PRACTICABLE TO EMPLOY  
 ANY MEANS OF HEAVY CLAMPS USE NO LEAD  
 WITH SOAPSUDES





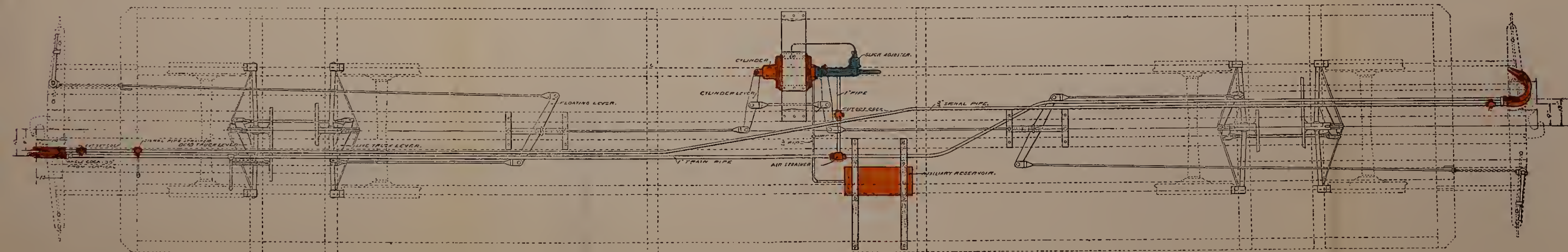


EXPLANATION OF TINTS

STANDARD QUICK-ACTION AUTOMATIC BRAKE AND TRAIN AIR-SIGNAL APPARATUS FURNISHED WITH COMPLETE PASSENGER-CAR EQUIPMENTS—SCHEDULES C-1, R, P AND K—SHOWN IN ORANGE TINT  
AMERICAN BRAKE COMPANY'S AUTOMATIC SLACK ADJUSTER SHOWN IN BLUE TINT

IMPORTANT SUGGESTIONS.

ALL BRAKE RODS, PINS, AND LEVERS ILLUSTRATED ARE M. C. B. STANDARD SIZES, AND NO DEVIATION THEREFROM SHOULD BE PERMITTED. IN PIPING, ELLS SHOULD NOT BE USED WHERE PRACTICABLE TO EMPLOY BENDS INSTEAD. REMOVE FINS CAREFULLY, BLOW OUT PIPES WITH STEAM, AND ATTACH FIRMLY TO CAR TIMBERS BY MEANS OF HEAVY CLAMPS. USE NO LEAD INSIDE OF SOCKETS, IF NEEDED, APPLY SPARINGLY ON OUTSIDE, AND TEST ALL CONNECTIONS UNDER PRESSURE WITH SOAPSUOS.







## ARCHITECTURE

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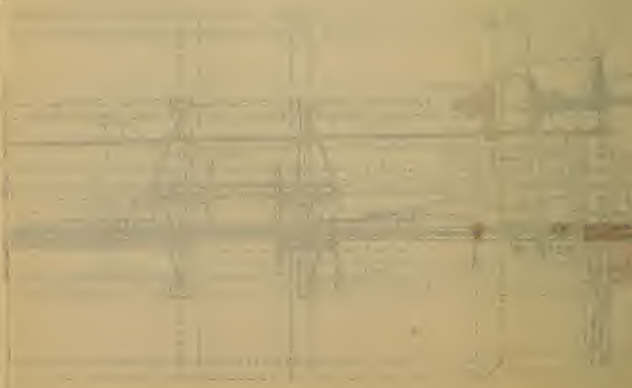
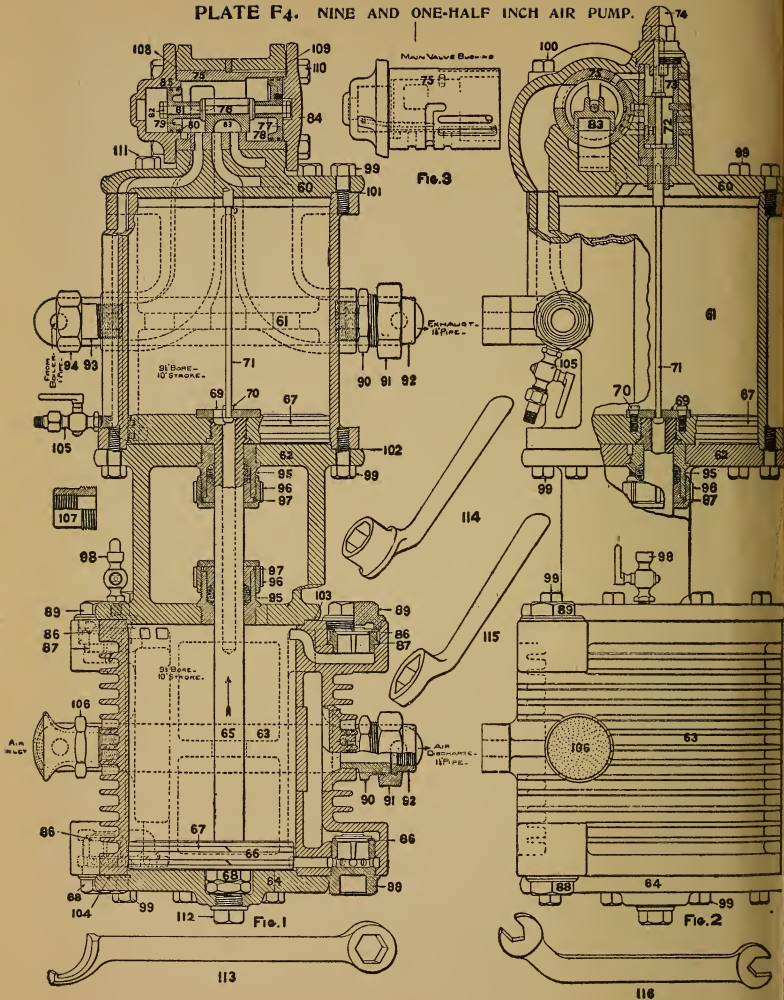




PLATE F<sub>4</sub>. NINE AND ONE-HALF INCH AIR PUMP.



# PLATE F 4.

## NINE AND ONE-HALF INCH AIR PUMP.

### No. 1. Nine and One-half inch Air Pump, complete.—

No.		No.	
60.	Top Head, complete (includes one each of Nos. 72, 73, 74, 75, 76, 83, 84, 85, 108, and 109, and 8 of No. 110)	82.	Main-Valve-Stem Nut.
61.	Steam Cylinder, complete (includes one each of Nos. 90, 91, 92, 93 and 94, and 2 of No. 105).	83.	Main Slide Valve.
62.	Center Piece, complete (includes 2 each of Nos. 95, 96, and 97, and one of No. 98).	84.	Right Main-Valve Cylinder Head.
63.	Air Cylinder, complete (includes 4 of No. 86, 2 each of Nos. 87, 88, and 89, and one each of Nos. 90, 91, 92, and 106).	85.	Left Main-Valve Cylinder Head.
64.	Lower Head.	86.	Air Valve.
65.	Steam Piston and Rod (includes 2 each of Nos. 67, 68, and 70, and one of No. 69).	87.	Air-Valve Seat.
66.	Air Piston, complete (includes 2 of No. 67).	88.	Air-Valve Cage.
67.	Piston Packing Ring	89.	Valve-Chamber Cap.
68.	Piston-Rod Nut	90.	One and One-fourth inch Union Stud.
69.	Reversing-Valve Plate	91.	One and One-fourth inch Union Nut.
70.	Reversing-Valve-Plate Bolt	92.	One and One-fourth inch Union Swivel.
71.	Reversing-Valve Rod.	93.	One-inch Steam-Pipe Stud.
72.	Reversing Valve.	94.	Governor Union Nut.
73.	Reversing-Valve-Chamber Bush.	95.	Stuffing Box.
74.	Reversing-Valve-Chamber Cap.	96.	Stuffing-Box Nut
75.	Main-Valve Bush.	97.	Stuffing-Box Gland.
76.	Main Valve, complete (includes Nos. 77, 79, and 81, and 4 of No. 82).	98.	Air-Cylinder Oil Cup.
77.	Large Main-Valve Piston (includes 2 of No. 78).	99.	Short Cap Screw ( $\frac{3}{8}$ "x1 $\frac{1}{2}$ "")
78.	Large Main-Valve-Piston Packing Ring	100.	Long Cap Screw ( $\frac{3}{8}$ "x6 $\frac{1}{2}$ "")
79.	Small Main-Valve Piston (includes 2 of No. 80).	101.	Upper Steam-Cylinder Gasket
80.	Small Main-Valve-Piston Packing Ring.	102.	Lower Steam-Cylinder Gasket
81.	Main-Valve Stem.	103.	Upper Air-Cylinder Gasket.
		104.	Lower Air-Cylinder Gasket.
		105.	Drain Cock.
		106.	Air Strainer.
		107.	One-inch Steam-Pipe Sleeve
		108.	Left Main-Valve-Head Gasket
		109.	Right Main-Valve-Head Gasket
		110.	Main-Valve-Head Bolt ( $\frac{3}{8}$ "x1 $\frac{1}{2}$ "")
		111.	Cap Screw ( $\frac{3}{8}$ "x2"").
		112.	Cylinder-Head Plug.
		113.	Packing and Cap-Nut Wrench
		114.	Air-Valve-Seat Wrench.
		115.	Air-Valve-Cage Wrench
		116.	Cap-Screw Wrench.

The accompanying cut illustrates the Standard 9 1/2-inch Air Pump, which is usually located on the right side of the locomotive. A special "Left-hand 9 1/2-inch Air Pump" is also manufactured. As its name indicates, it is designed for installation on the left side of the locomotive; but all its parts are interchangeable with those of the Standard Pump, and its steam and exhaust-pipe connections have been so arranged that it can be substituted for the same and used on the right side if desired.

### ENGINEER'S BRAKE VALVE.

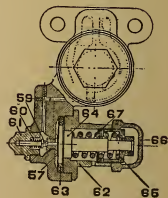
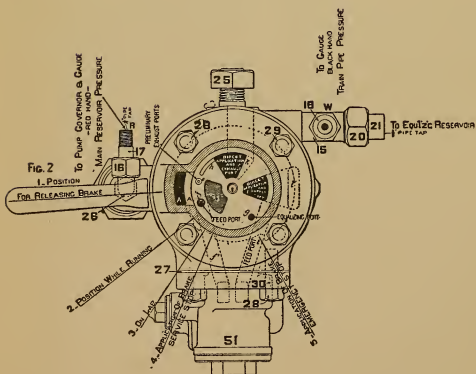
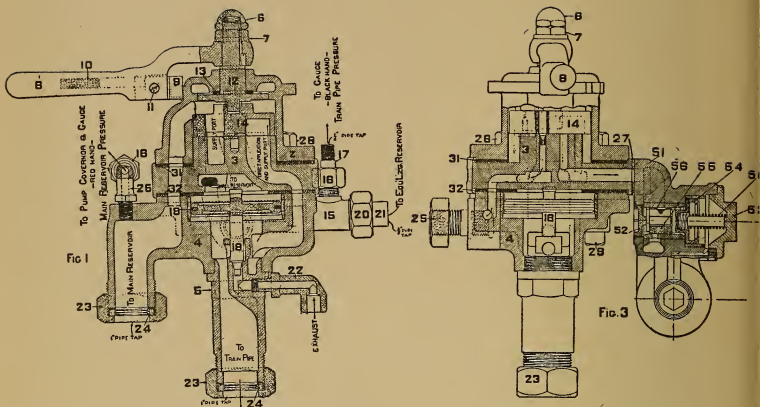


Fig. 4.



## PLATE G 6.

### ENGINEER'S BRAKE VALVE.

**No. 100. Brake Valve with Slide-Valve Feed Valve, One-Inch Cut-out Cock (Fig. 6, Plate G 32), and Equalizing Reservoir (Fig. 4, Plate G 23) Complete.**

**No. 1. Brake Valve proper (without Feed-Valve Attachment); covers Nos. 2 to 32, inclusive.**

No.		No.	
2.	Valve Body.	18.	Piston Valve (includes No. 19).
3.	Rotary-Valve Seat.	19.	Piston Ring.
4.	Bottom Case.	20.	Three-eighths inch Union Nut.
5.	Bottom Cap.	21.	Three-eighths inch Union Swivel.
6.	Jam Nut.	22.	Exhaust-Pipe Fitting.
7.	Top Nut.	23.	One-inch Union Nut.
8.	Handle (includes Nos. 9, 10, and 11).	24.	One-inch Union Swivel.
9.	Handle Bolt.	25.	Holding Nut.
10.	Handle-Bolt Spring.	26.	Gauge-Pipe Fitting.
11.	Handle-Bolt Screw.	27.	Feed-Valve-Case Gasket.
12.	Rotary-Valve Key.	28.	Half-inch Nut.
13.	Washer.	29.	Half-inch Bolt.
14.	Rotary Valve.	30.	Feed-Valve Stud.
15.	Gauge-Pipe Tee.	31.	Upper Gasket.
16.	One-fourth inch Union Nut.	32.	Lower Gasket.
17.	One-fourth inch Union Swivel.		

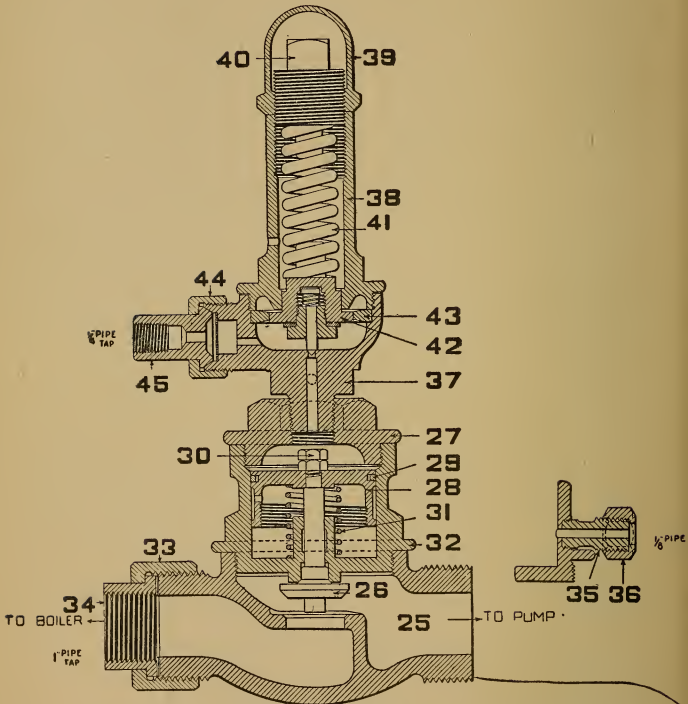
**No. 50. Slide-Valve Feed Valve, complete; covers Nos. 51 to 67, inclusive.**

51.	Feed-Valve Body (bushed).	60.	Regulating-Valve Spring.
52.	Flush Nut.	61.	Regulating-Valve Cap Nut.
53.	Cap Nut.	62.	Spring Box.
54.	Supply-Valve Piston.	63.	Diaphragm Ring.
55.	Supply Valve.	64.	Diaphragm Spindle.
56.	Supply-Valve Spring.	65.	Regulating Nut.
57.	Diaphragm (2 pieces).	66.	Check Nut.
58.	Supply-Valve-Piston Spring.	67.	Regulating Spring.
59.	Regulating Valve.		

# PLATE F7.

## ONE-INCH PUMP GOVERNOR.

STANDARD FOR NINE AND ONE-HALF INCH PUMP.



NOTE.—When used in conjunction with an Engineer's Brake Valve having a Feed Valve as in most instances, the Pump Governor should be piped to the Main Reservoir Connection at the Brake Valve, as indicated on Plates "F6" and "G6", when an Excess-Pressure Valve is used in place of a Feed Valve, however, the Governor is actuated by Train Line Pressure, and should be piped to Train Line accordingly.

## PLATE F7.

### ONE-INCH PUMP GOVERNOR.

---

#### No. 1. One-Inch Pump Governor, complete.

No.		No.	
25.	Steam-Valve Body	35.	Waste-Pipe Stud.
26.	Steam Valve.	36.	Waste-Pipe Union Nut.
27.	Cylinder Cap.	37.	Diaphragm Body.
28.	Governor Piston (includes No. 29).	38.	Spring Box.
29.	Piston Packing Ring.	39.	Cap Nut.
30.	Governor-Piston Nut.	40.	Regulating Nut.
31.	Governor-Piston Spring.	41.	Regulating Spring.
32.	Steam-Valve Cylinder (includes No. 35 and 36).	42.	Diaphragm, complete.
33.	One-inch Union Nut.	43.	Diaphragm Ring.
34.	One-inch Union Swivel.	44.	Union Nut.
		45.	Union Swivel.

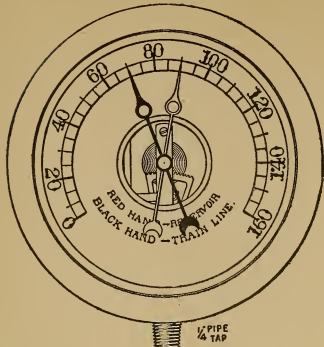


Fig. 1.

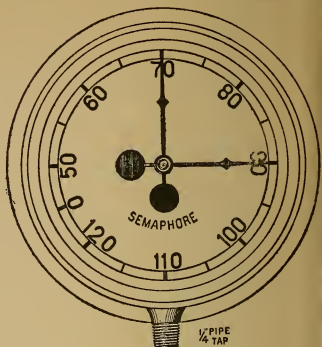


Fig. 2.

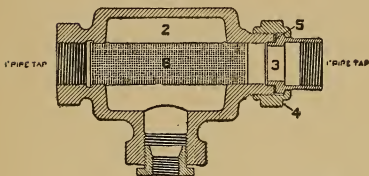


Fig. 3.

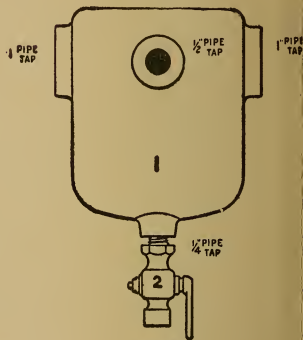


Fig. 4.



Fig. 5.

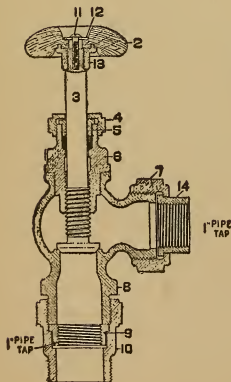


Fig. 6.



Fig. 7.

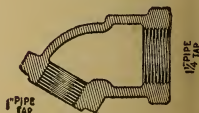


Fig. 8.



Fig. 9.



Fig. 10.

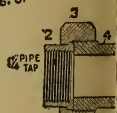


Fig. 11.

## PLATE G9.

### DETAIL PARTS OF ENGINE AND TENDER BRAKE APPARATUS.

FIG. 1.

**Standard Duplex Air Gauge.**

FIG. 2.

**Semaphore Air Gauge.**

FIG. 3.

**One-inch by One-half inch Brake-Pipe Air Strainer, complete.**

- No.  
2. Strainer Body.  
3. One-inch Union Swivel.  
4. Union Nut.  
5. Union Gasket.  
6. Strainer.

FIG. 4.

**One-inch Steam Valve, complete.**

- No.  
2. Hand Wheel.  
3. Valve Stem.  
4. Packing Nut.  
5. Packing Gland.  
6. Neck Piece.  
7. Union Nut.  
8. Valve Body.  
9. Union Swivel.\*  
10. Valve Stud.\*  
11. Hand-Wheel Screw  
12. Hand-Wheel Washer  
13. Hand-Wheel Socket.  
14. Steam-Pipe Swivel.

FIG. 5.

**Plain Triple-Valve Bracket.**

FIG. 6.

**Tender Drain Cup, complete.**

- No.  
1. Tender Drain Cup.  
2. Tender Drain Cock.

FIG. 7.

**Plain Triple-Valve Nipple.**

FIG. 8.

**One-inch by One and One-fourth inch Angle Fitting.**

FIG. 9.

**Three-fourths inch Reservoir Union, complete.**

- No.  
2. Union Swivel.  
3. Union Nut.  
4. Union Stud.

FIG. 10.

**One-inch Reservoir Union, complete.**

- No.  
2. Union Swivel.  
3. Union Nut.  
4. Union Stud.

FIG. 11.

**One and One-fourth inch Reservoir Union, complete.**

- No.  
2. Union Swivel.  
3. Union Nut.  
4. Union Stud.



## PLATE G14.

### PRESSURE HEADS FOR BRAKE CYLINDERS.



Fig. 1.



Fig. 2.

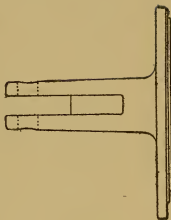


Fig. 3.



Fig. 4.



Fig. 5.

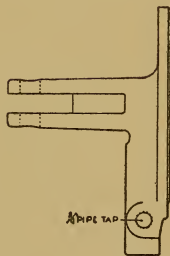


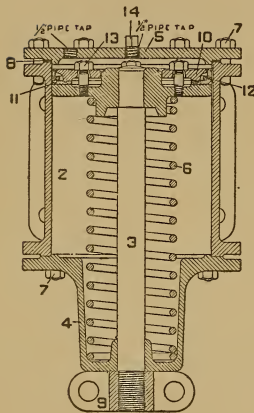
Fig. 6.

#### EXPLANATION OF TYPES ILLUSTRATED.

- Fig. 1. Type O—Plain Head.
- Fig. 2. Type P—Plain Head with Slack Adjuster Lug.
- Fig. 3. Type Q—Bracket Head.
- Fig. 4. Type R—Quick-Action Triple Valve Head.
- Fig. 5. Type S—Quick-Action Triple Valve Head with Slack Adjuster Lug.
- Fig. 6. Type T—Quick-Action Triple Valve Head with Bracket.

## PLATE F15.

### STANDARD PUSH-DOWN TYPE DRIVER-BRAKE CYLINDERS.



- No. 2. Cylinder Body.  
 3. Piston and Rod (includes Follower Studs and Nuts).  
 4. Non-Pressure Head.  
 5. Pressure Head.  
 6. Release Spring.  
 7. Cylinder-Head Bolt and Nut.  
 8. Cylinder Gasket.

OUTER FLANGES FULL.			
Cylinder No.	Diameter.		Stroke.
11	8 in.	X	7 in.
13	12 "	X	8 "
15	12 "	X	10 "
30	10 "	X	6 "
33	8 "	X	6 "
35	10 "	X	10 "
39	12 "	X	12 "
42	14 "	X	12 "
47	16 "	X	12 "
48	6 "	X	8 "
49	12 "	X	7 "
50	13 "	X	12 "
51	10 "	X	6 "
55	10 "	X	8 "
66	6 "	X	6 "
99	10 "	X	12 "

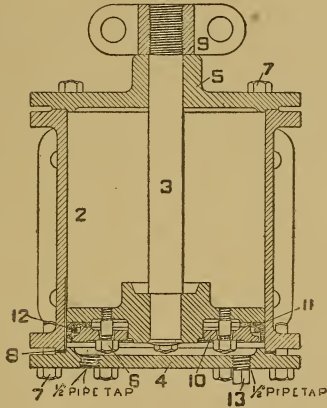
OUTER FLANGES REMOVED.			
Cylinder No.	Diameter.		Stroke.
22	8 in.	X	7 in.
31	10 "	X	6 "
36	10 "	X	10 "
40	12 "	X	12 "
44	8 "	X	6 "
77	6 "	X	6 "
88	10 "	X	8 "

- No. 9. Cross Head (select kind desired from Plate F 22).  
 10. Follower.  
 11. Packing Leather.  
 12. Packing Expander.  
 13. Follower Stud and Nut.  
 14. Oil Plug.



# PLATE F17.

## STANDARD PUSH-UP TYPE DRIVER-BRAKE CYLINDERS.



### OUTER FLANGES FULL.

Cylinder No.	Diameter.		Stroke.
16	8 in.	x	7 in.
18	10 "	x	8 "
23	12 "	x	10 "
46	12 "	x	8 "

### OUTER FLANGES REMOVED.

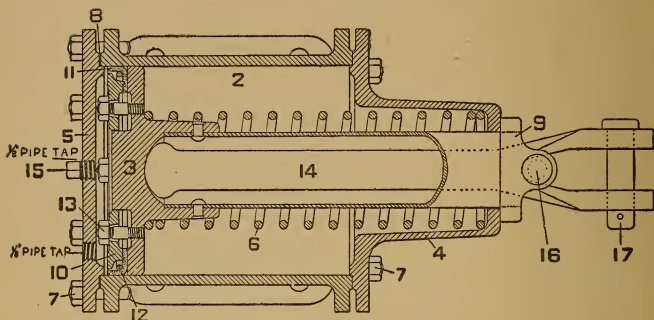
Cylinder No.	Diameter.		Stroke.
17	8 in.	x	7 in.
19	10 "	x	8 "

- No.
2. Cylinder Body.
  3. Piston and Rod (includes Follower Studs and Nuts).
  4. Pressure Head.
  5. Non-Pressure Head.
  6. Follower Stud and Nut.
  7. Cylinder-Head Bolt and Nut.

- No.
8. Cylinder Gasket.
  9. Cross Head (select kind desired from Plate F 22).
  10. Follower.
  11. Packing Leather.
  12. Packing Expander.
  13. Oil Plug.

# PLATE F19.

## STANDARD TYPE "B" PUSH DRIVER-BRAKE CYLINDERS.



### OUTER FLANGES FULL.

Cylinder No.	Diameter.		Stroke.
11-B	8 in.	x	7 in.
13-B	12 "	x	8 "
15-B	12 "	x	10 "
21-B	14 "	x	10 "
33-B	8 "	x	6 "
35-B	10 "	x	10 "
39-B	12 "	x	12 "
42-B	14 "	x	12 "
47-B	16 "	x	12 "
48-B	6 "	x	8 "
49-B	12 "	x	7 "
50-B	13 "	x	12 "
51-B	10 "	x	6 "
55-B	10 "	x	8 "
90-B	10 "	x	12 "

### OUTER FLANGES REMOVED.

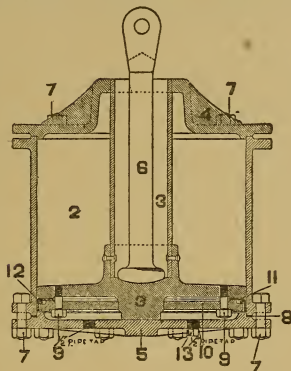
Cylinder No.	Diameter.		Stroke.
22-B	8 in.	x	7 in.
36-B	10 "	x	10 "
44-B	8 "	x	6 "
88-B	10 "	x	8 "

- No.
- Cylinder Body.
  - Piston and Rod (includes No. 9, and Follower Studs and Nuts).
  - Non-Pressure Head.
  - Pressure Head.
  - Release Spring.
  - Cylinder-Head Bolt and Nut.
  - Cylinder Gasket.
  - Push-Rod Holder.

- No.
- Follower.
  - Packing Leather.
  - Packing Expander.
  - Follower Stud and Nut.
  - Push Rod, complete (includes Nos. 15 and 16).
  - Oil Plug.
  - Push-Rod-Holder Pin, with Cotter
  - Push-Rod Pin, with Cotter.

# PLATE F 20.

## STANDARD TYPE "C" PUSH DRIVER-BRAKE CYLINDERS.



### OUTER FLANGES FULL.

Cylinder No.	Diameter.		Stroke.
11-C	8 in.	x	7 in.
13-C	12 "	x	8 "
15-C	12 "	x	10 "
21-C	14 "	x	10 "
30-C	10 "	x	6 "
33-C	8 "	x	6 "
35-C	10 "	x	10 "
39-C	12 "	x	12 "
42-C	14 "	x	12 "
55-C	10 "	x	8 "
99-C	10 "	x	12 "

### OUTER FLANGES REMOVED.

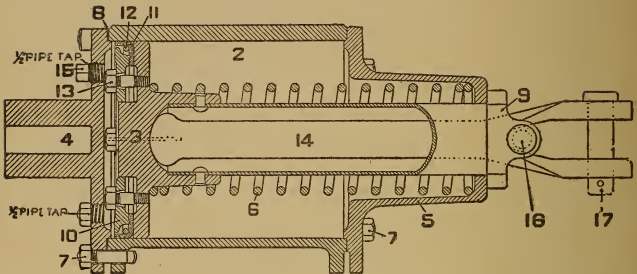
Cylinder No.	Diameter.		Stroke.
22-C	8 in.	x	7 in.
31-C	10 "	x	6 "
36-C	10 "	x	10 "
44-C	8 "	x	6 "
88-C	10 "	x	8 "

- No.
2. Cylinder Body.
  3. Piston and Rod (includes Follower Studs and Nuts).
  4. Non-Pressure Head.
  5. Pressure Head.
  6. Push Rod, complete.
  7. Cylinder-Head Bolt and Nut.

- No.
8. Cylinder Gasket.
  9. Follower Stud and Nut.
  10. Follower.
  11. Packing Leather.
  12. Packing Expander.
  13. Oil Plug.

# PLATE F 21.

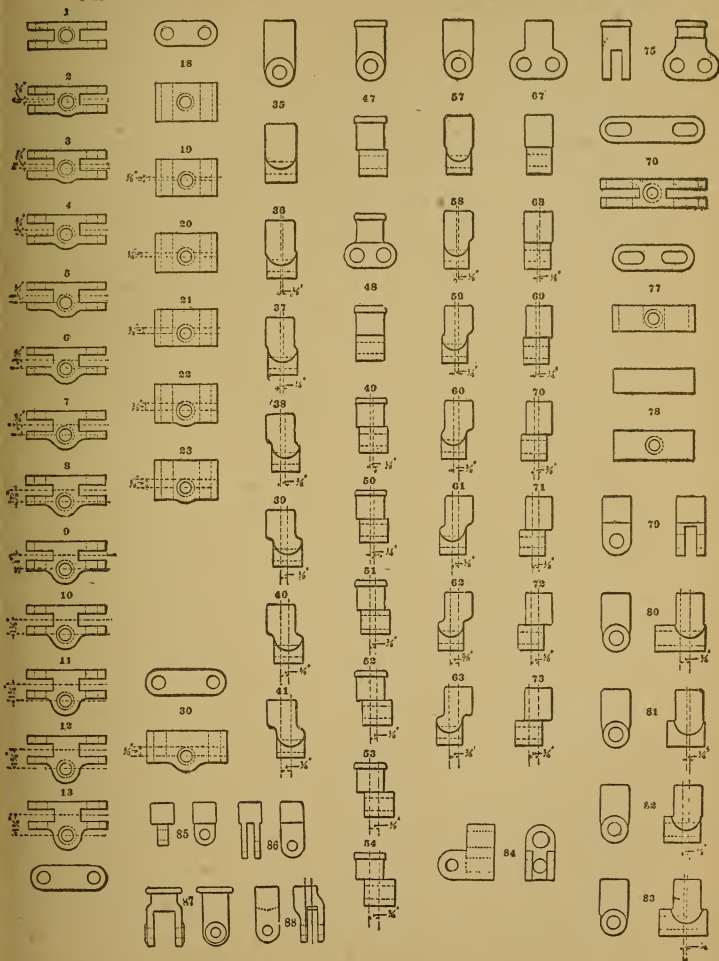
## STANDARD TYPE "D" ENGINE-TRUCK BRAKE CYLINDERS.



Cylinder No.	Diameter.		Stroke.
11-D	8 in.	x	7 in.
35-D	10 "	x	10 "
43-D	8 "	x	12 "
48-D	6 "	x	8 "
49-D	12 "	x	7 "
55-D	10 "	x	8 "
68-D	6 "	x	6 "
99-D	10 "	x	12 "

- |   |   |
|---|---|
| <p>No.</p> <p>2. Cylinder Body.</p> <p>3. Piston and Rod (includes No. 9, and Follower Studs and Nuts).</p> <p>4. Pressure Head.</p> <p>5. Non-Pressure Head.</p> <p>6. Release Spring.</p> <p>7. Cylinder-Head Bolt and Nut.</p> <p>8. Cylinder Gasket.</p> <p>9. Push-Rod Holder.</p> | <p>No.</p> <p>10. Follower.</p> <p>11. Packing Leather.</p> <p>12. Packing Expander.</p> <p>13. Follower Stud and Nut.</p> <p>14. Push Rod, complete (includes Nos. 15 and 16).</p> <p>15. Oil Plug.</p> <p>16. Push-Rod-Holder Pin, with cotter.</p> <p>17. Push-Rod Pin, with cotter.</p> |
|---|---|

# PLATE F 22. PISTON CROSS HEADS FOR DRIVER-BRAKE CYLINDERS.



# PLATE G23. RESERVOIRS.

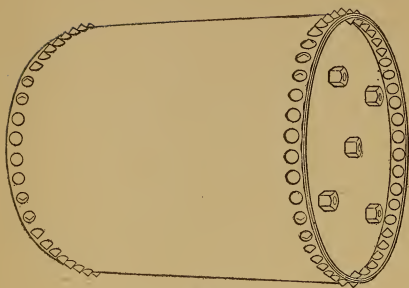


Fig. 1.

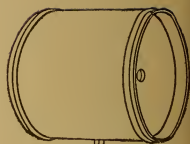


Fig. 4.



Fig. 5.

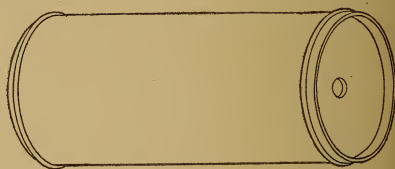


Fig. 2.

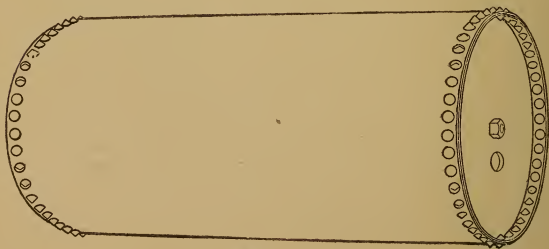


Fig. 3.

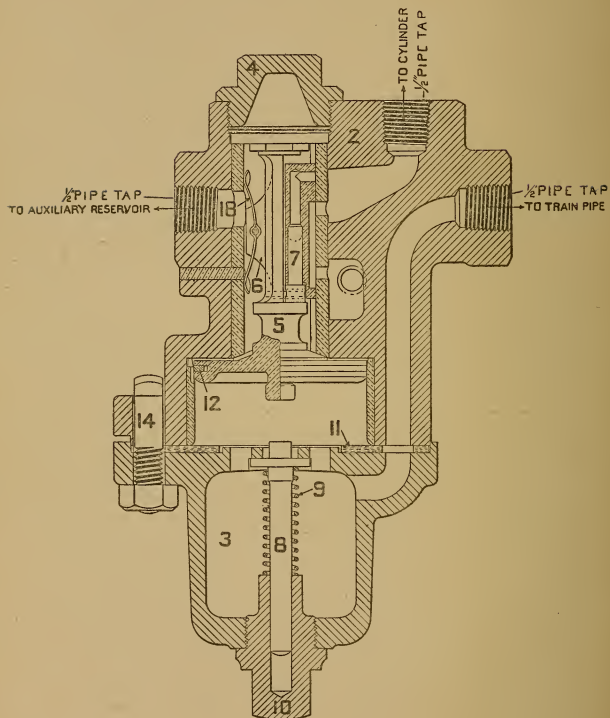
## PLATE G 23.

### RESERVOIRS.

- FIG. 1.** { Main Reservoirs of the type illustrated, and of any desired length, are manufactured of the following standard diameters in inches, outside measurement; viz., 16, 18 $\frac{1}{2}$ , 20 $\frac{1}{2}$ , 22 $\frac{1}{2}$ , 24 $\frac{1}{2}$ , 26 $\frac{1}{2}$ , 28 $\frac{1}{2}$ , 30 $\frac{1}{2}$ , 32 $\frac{1}{2}$ , 34 $\frac{1}{2}$ , 36 $\frac{1}{2}$ . To ascertain approximate capacity in cubic inches, multiply the square of the inside diameter (which is  $\frac{1}{2}$  inch less than the size specified) by .7854, and the product by the length, less an allowance of three inches to cover flanges.
- Main-Reservoir capacity for Passenger Engines should not be less than 20,000 cubic inches, and for Freight Engines, not less than 40,000 cubic inches.
- FIG. 2.** { Standard Auxiliary Reservoirs of the type illustrated are manufactured in the following sizes, and for use in connection with the Brake Cylinders specified:
- |        |            |   |
|--------|------------|---|
| 10-in. | by 24-in., | for 8-in. Tender and Truck-Brake Cylinders. |
| 10 "   | by 33 "    | " 8-in. Driver-Brake Cylinders.             |
| 12 "   | by 33 "    | " 10-in. Brake Cylinders of all kinds.      |
| 14 "   | by 33 "    | " 12-in. " " "                              |
| 16 "   | by 33 "    | " 14-in. " " "                              |
- Auxiliary Reservoirs are tapped for pipe connections as follows:
- |        |            |  |
|--------|------------|--|
| 10-in. | by 24-in., | for $\frac{1}{2}$ -inch pipe, all others for $\frac{3}{4}$ -inch pipe. |
|--------|------------|--|
- FIG. 3.** { Special Auxiliary Reservoir of the type illustrated, 18 $\frac{1}{2}$ -in. by 41-in. For 16-inch Driver-Brake Cylinders. Tapped for  $\frac{3}{4}$ -inch pipe.
- FIG. 4.** { Equalizing Reservoir, 10-in. by 12-in. For use in connection with Engineer's Brake Valve. Tapped for  $\frac{3}{4}$ -inch pipe.
- FIG. 5.** < Reservoir Drain Cock.

# PLATE G 24. PLAIN TRIPLE VALVE.

FOR 8-INCH, AND 10-INCH CYLINDERS





## PLATE G 24.

### PLAIN TRIPLE VALVE.

FOR 8-INCH, AND 10-INCH CYLINDERS.

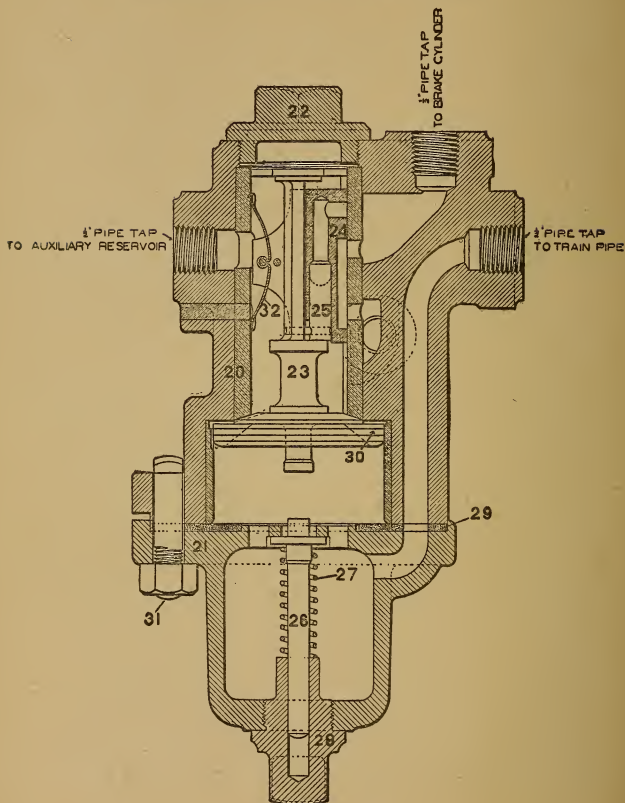
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#### No. 1. "G 24" Plain Triple Valve, complete.

No.		No.	
2.	Triple-Valve Body (bushed)	9.	*Graduating Spring.
3.	Cylinder Cap.	10.	Graduating-Stem Nut.
4.	Cap Nut.	11.	Cylinder Gasket.
5.	Piston (includes No. 12)	12.	Packing Ring.
6.	Slide Valve.	14.	Bolt.
7.	Graduating Valve.	18.	Slide-Valve Spring.
8.	Graduating Stem.		

\*GRADUATING SPRING SPECIFICATIONS. Phosphor-Bronze Spring Wire, No. 14 B. W. G.;  $1\frac{5}{16}$  inches in diameter; 12 coils, 2 1/2 inches free height,  $2\frac{1}{4}$  inches inside diameter.

**PLATE F 25. PLAIN TRIPLE VALVE.**  
 FOR 12-INCH, 14-INCH, AND 16-INCH DRIVER-BRAKE CYLINDERS.



NOTE.—The "F25" Plain Triple Valve should be used with 12-inch, 14-inch, and 16-inch Driver-Brake Cylinders, with or without Truck Brake; and for no other purpose.

## PLATE F25.

### PLAIN TRIPLE VALVE.

FOR 12-INCH, 14-INCH, AND 16-INCH DRIVER-BRAKE CYLINDERS.

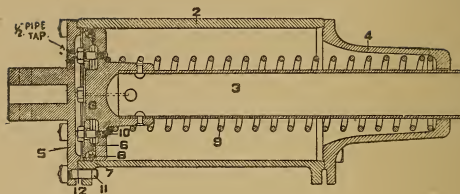
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#### No. 1. "F25" Plain Triple Valve, complete.

No.		No.	
20.	Triple-Valve Body (bushed).	27.	Graduating Spring.
21.	Cylinder Cap.	28.	Graduating-Stem Nut.
22.	Cap Nut.	29.	Cylinder Gasket.
23.	Piston (includes No. 30).	30.	Packing Ring.
24.	Slide Valve.	31.	Bolt and Nut.
25.	Graduating Valve.	32.	Slide-Valve Spring.
26.	Graduating Stem.		

## PLATE G 26.

### TENDER-BRAKE CYLINDERS.



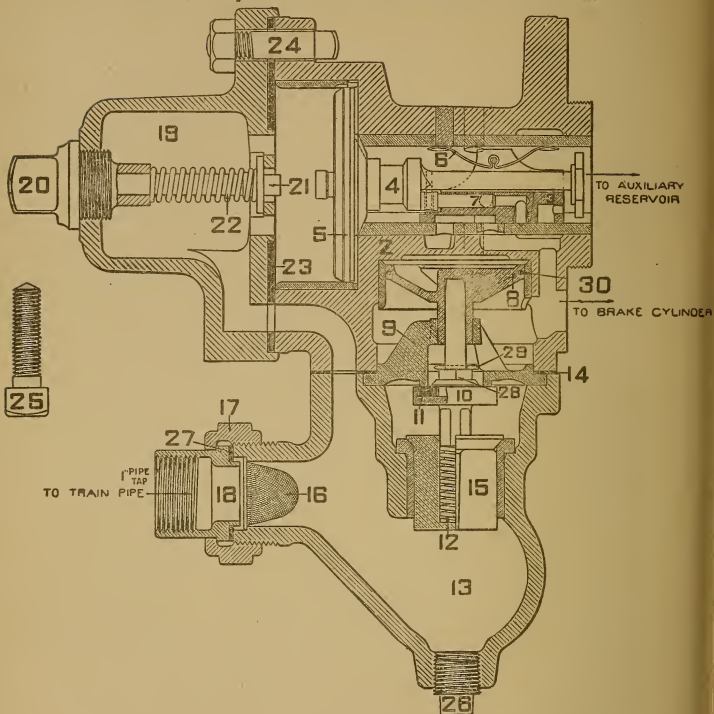
No. 1. Tender-Brake Cylinder, complete.

No.		No.	
2.	Cylinder Body.	7.	Packing Leather.
3.	Piston and Rod (includes Follower Studs and Nuts).	8.	Packing Expander.
4.	Non-Pressure Head.	9.	Release Spring.
*5.	Pressure Head.	10.	Follower Stud and Nut.
6.	Follower.	11.	Cylinder-Head Bolt and Nut.
		12.	Cylinder Gasket.

\* NOTE.—For locomotive tenders, the light weight of which does not exceed 35,000 pounds, use the 8-inch Tender-Brake Cylinder; for tenders of greater weight, use the 10-inch size. The style of cylinder head, illustrated above, viz., "Plain Head, with Slack-adjuster Lug," is considered standard.



# PLATE F 27. QUICK-ACTION PASSENGER TRIPLE VALVE.



NOTE.—The "F 27" Triple Valve should be used in connection with the following apparatus only:

- Passenger-Car Brake Cylinders, 10 inches AND LESS in diameter;
- High-Speed Tender-Brake Cylinders, 10 inches in diameter.

Though similar in appearance, this valve differs essentially from the "F 36," or Freight Triple-Valve, and should never be employed in connection with Freight-Car Brakes. In common with the other Passenger Triple, "F 29," it may be distinguished from the Freight Triple by the fact that it has but one exhaust outlet while the "F 36" Valve has two. The three Quick-Action Triple-Valves may be identified also by the bore of the Slide-Valve Bush which measures  $1 \frac{3}{8}$  inches in the "F 27,"  $1 \frac{3}{4}$  inches in the "F 29," and  $1 \frac{1}{4}$  inches in the "F 36" Valve.

## PLATE F 27.

### QUICK-ACTION PASSENGER TRIPLE VALVE.

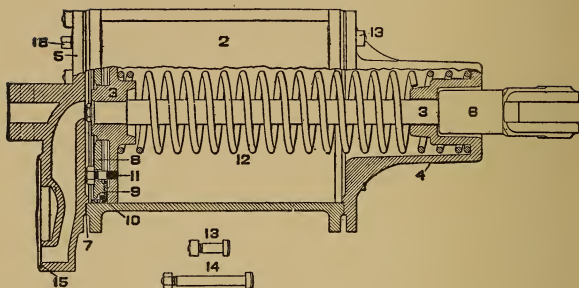
#### No. 1. "F 27" Quick-Action Passenger Triple Valve, complete.

- |                                |                                    |
|--------------------------------|------------------------------------|
| No.                            | No.                                |
| 2. Triple-Valve Body (bushed). | 17. Union Nut.                     |
| 3. Slide Valve.                | 18. Union Swivel.                  |
| 4. Piston (includes No. 5).    | 19. Cylinder Cap.                  |
| 5. Packing Ring.               | 20. Graduating-Stem Nut.           |
| 6. Slide-Valve Spring.         | 21. Graduating Stem.               |
| 7. Graduating Valve.           | 22. *Graduating Spring.            |
| 8. Emergency-Valve Piston.     | 23. Cylinder-Cap Gasket.           |
| 9. Emergency-Valve Seat.       | 24. Bolt and Nut.                  |
| 10. Emergency Valve.           | 25. Half-inch Cap Screw.           |
| 11. Rubber Seat.               | 26. Half-inch Plug.                |
| 12. Check-Valve Spring.        | 27. Union Gasket.                  |
| 13. Check-Valve Case (bushed). | 28. Emergency-Valve Nut.           |
| 14. Check-Valve-Case Gasket.   | 29. Cotter Pin.                    |
| 15. Check Valve.               | 30. Emergency-Valve Piston Packing |
| 16. Strainer.                  | Ring.                              |

\* GRADUATING SPRING SPECIFICATIONS: Eight one hundredths ( $\frac{1}{100}$ ) inches diameter, Nickered Steel "Piano" Wire; 13  $\frac{1}{4}$  coils; 2  $\frac{5}{8}$  inches free height;  $\frac{3}{4}$  inches inside diameter.

# PLATE F28.

## TEN-INCH PASSENGER-CAR BRAKE CYLINDERS.



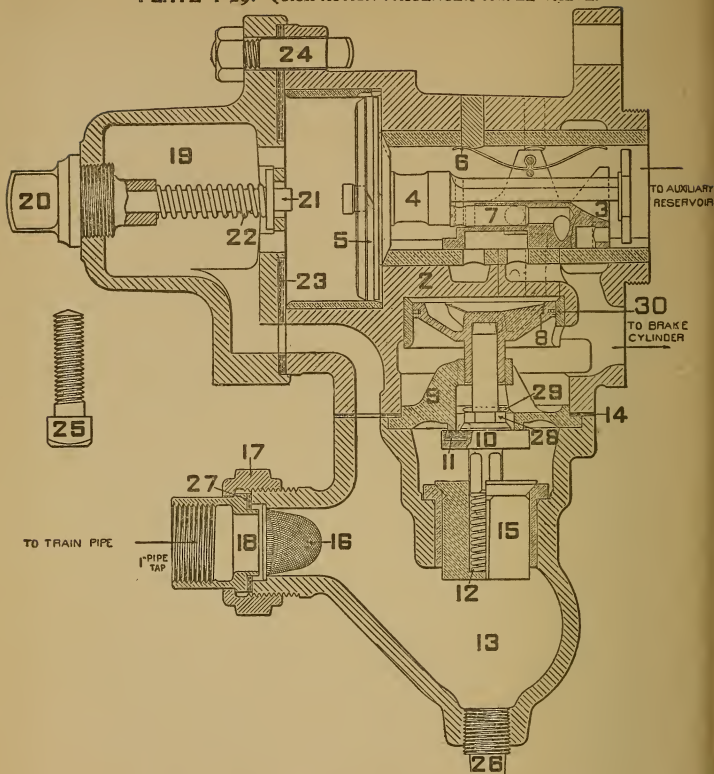
No. 1. Ten-inch Passenger-Car Brake Cylinder, complete.

- |   |                                 |
|---|---------------------------------|
| No.   | No.                             |
| 2. Cylinder Body.                                     | 9. Packing Leather.             |
| 3. Piston and Rod (includes Follower Studs and Nuts). | 10. Packing Expander.           |
| 4. Non-Pressure Head.                                 | 11. Follower Stud and Nut.      |
| 5. Pressure Head (includes 2 of No. 14).              | 12. Release Spring.             |
| 6. Cross Head.  | 13. Cylinder-Head Bolt and Nut. |
| 7. Cylinder Gasket.                                   | 14. Triple-Valve Bolt and Nut.  |
| 8. Follower.  | 15. Triple-Valve Gasket.        |
|   | 16. Half-inch Plug.             |





PLATE F 29. QUICK-ACTION PASSENGER TRIPLE VALVE.



NOTE.—The "F 29" Triple Valve should be used in connection with Passenger-Car Brake Cylinders, 12 and 14 inches in diameter.

Though similar in appearance this valve differs essentially from both the "F 27" and "F 36" Triples, and should never be employed except as specified. It may be easily recognized by means of the letter "O" cast on the valve body. In common with the other Passenger Triple, "F 27," it may be distinguished from the Freight Triple by the fact that it has but one exhaust outlet while the "F 36" valve has two. The three Quick-Action Triple-Valves may be identified also by the bore of the Slide-Valve Bush which measures  $1 \frac{3}{8}$  inches in the "F 27,"  $1 \frac{3}{4}$  inches in the "F 29," and  $1 \frac{1}{4}$  inches in the "F 36" Valve.

## PLATE F 29.

### QUICK-ACTION PASSENGER TRIPLE VALVE.

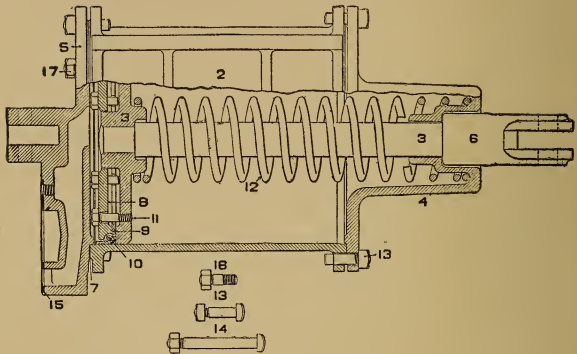
#### No. 1. "F 29" Quick-Action Passenger Triple Valve, complete.

- |                                |                                    |
|--------------------------------|------------------------------------|
| No.                            | No.                                |
| 2. Triple-Valve Body (bushed). | 17. Union Nut.                     |
| 3. Slide Valve.                | 18. Union Swivel.                  |
| 4. Piston (includes No. 5).    | 19. Cylinder Cap.                  |
| 5. Packing Ring.               | 20. Graduating-Stem Nut.           |
| 6. Slide-Valve Spring.         | 21. Graduating Stem.               |
| 7. Graduating Valve.           | 22. *Graduating Spring.            |
| 8. Emergency-Valve Piston.     | 23. Cylinder-Cap Gasket.           |
| 9. Emergency-Valve Seat.       | 24. Bolt and Nut.                  |
| 10. Emergency Valve.           | 25. Half-inch Cap Screw.           |
| 11. Rubber Seat.               | 26. Half-inch Plug.                |
| 12. Check-Valve Spring.        | 27. Union Gasket.                  |
| 13. Check-Valve Case (bushed). | 28. Emergency-Valve Nut.           |
| 14. Check-Valve-Case Gasket.   | 29. Cotter Pin.                    |
| 15. Check Valve.               | 30. Emergency-Valve Piston Packing |
| 16. Strainer.                  | Ring.                              |

\*GRADUATING SPRING SPECIFICATIONS: Eight one hundredths ( $\frac{1}{100}$ ) inches diameter  
Nickel Steel "Piano" Wire; 13  $\frac{1}{4}$  coils; 2  $\frac{5}{8}$  inches free height;  $\frac{1}{4}$  inches inside diameter.

# PLATE F 30.

## TWELVE-INCH PASSENGER-CAR BRAKE CYLINDER.

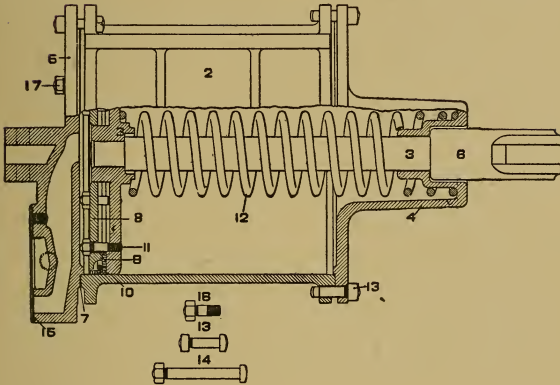


No. 1. Twelve-inch Passenger-Car Brake Cylinder, complete.

- |  |   |
|--|---|
| <p>No.</p> <p>2. Cylinder Body.</p> <p>3. Piston and Rod (includes Follower Studs and Nuts).</p> <p>4. Non-Pressure Head.</p> <p>5. Pressure Head (includes No. 16, and 2 of No. 14).</p> <p>6. Cross Head.</p> <p>7. Cylinder Gasket.</p> <p>8. Follower.</p> | <p>No.</p> <p>9. Packing Leather.</p> <p>10. Packing Expander.</p> <p>11. Follower Stud and Nut.</p> <p>12. Release Spring.</p> <p>13. Cylinder-Head Bolt and Nut.</p> <p>14. Triple-Valve Bolt and Nut.</p> <p>15. Triple-Valve Gasket.</p> <p>16. Triple-Valve Stud and Nut.</p> <p>17. Half-inch Plug.</p> |
|--|---|

# PLATE F 31.

## FOURTEEN-INCH PASSENGER-CAR BRAKE CYLINDER.



No. 1. Fourteen-inch Passenger-Car Brake Cylinder, complete.

- |     |   |
|-----|---|
| No. |   |
| 2.  | Cylinder Body.                                    |
| 3.  | Piston and Rod (includes Follower Studs and Nuts) |
| 4.  | Non-Pressure Head.                                |
| 5.  | Pressure Head (includes No. 16, and 2 of No. 14). |
| 6.  | Cross Head.                                       |
| 7.  | Cylinder Gasket.                                  |
| 8.  | Follower.   |

- |     |                             |
|-----|-----------------------------|
| No. |                             |
| 9.  | Packing Leather.            |
| 10. | Packing Expander.           |
| 11. | Follower Stud and Nut.      |
| 12. | Release Spring.             |
| 13. | Cylinder-Head Bolt and Nut. |
| 14. | Triple-Valve Bolt and Nut.  |
| 15. | Triple-Valve Gasket.        |
| 16. | Triple-Valve Stud and Nut.  |
| 17. | Half-inch Plug.             |

PLATE G 32. DETAIL PARTS OF PASSENGER-CAR BRAKE APPARATUS.

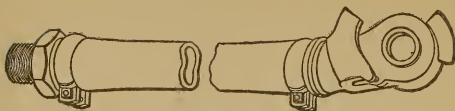


Fig. 1.

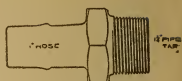


Fig. 3.



Fig. 2.

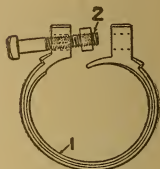


Fig. 4.

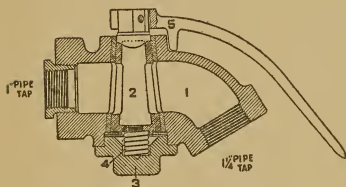


Fig. 5.

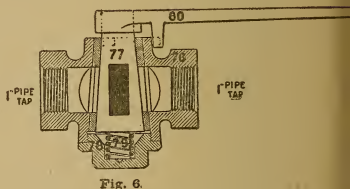


Fig. 6.

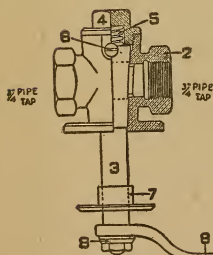


Fig. 7.

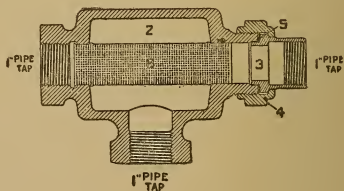


Fig. 8.



Fig. 9.

## PLATE G32.

### DETAIL PARTS OF PASSENGER-CAR BRAKE APPARATUS.

FIG. 1.

**Standard One-inch Hose and Coupling, complete.**

Hose 22 inches long (order in pairs.)

FIG. 2.

**Standard One-inch Hose Coupling (order in pairs).**

No.

1. Hose-Coupling Case.
2. Hose-Coupling Packing Ring.

FIG. 3.

**One-inch by One and One-fourth inch Hose Nipple.**

FIG. 4.

**One-inch Hose Clamp, complete.**

No.

1. One-inch Hose Clamp.
2. One-inch Hose-Clamp Bolt.

FIG. 5.

**One-inch by One and One-fourth inch Angle Cock, complete.**

No.

1. Angle-Cock Body.
2. Angle-Cock Key.
3. Angle-Cock Cap.
4. Angle-Cock-Key Spring.
5. Angle-Cock Handle.
6. One and One-fourth inch to One-inch Reducer.

FIG. 6.

**One-inch Cut-out Cock, complete.**

No.

76. Cock Body.
77. Cock Key.
78. Cock Cap.
79. Key Spring.
80. Handle.

FIG. 7.

**Conductor's Valve, complete.**

No.

2. Valve Body.
3. Valve Key.
4. Valve Cap.
5. Key Spring.
6. Key Stop.
7. Key Escutcheon.
8. Valve Handle.
9. Key Nut.

FIG. 8.

**One-inch Brake-Pipe Air Strainer, complete.**

No.

2. Strainer Body.
3. One-inch Union Swivel.
4. Union Nut.
5. Union Gasket.
6. Strainer.

FIG. 9.

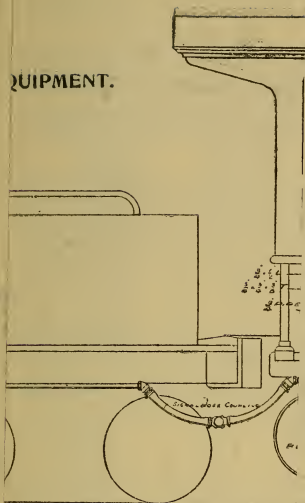
**One-inch Dummy Coupling.**

PLATE F 33.

Westinghouse Standard Train Air-Signal Equipment.—*Opposite.*



EQUIPMENT.



NOTE  
THE ABOVE DIAGRAM  
IS ARRANGING THE  
AND MAY BE MODIFIED



3" PIPE  
7/8" TAP

TO MAIN RESERVOIR

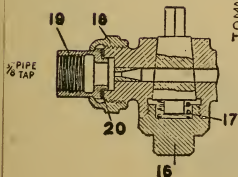
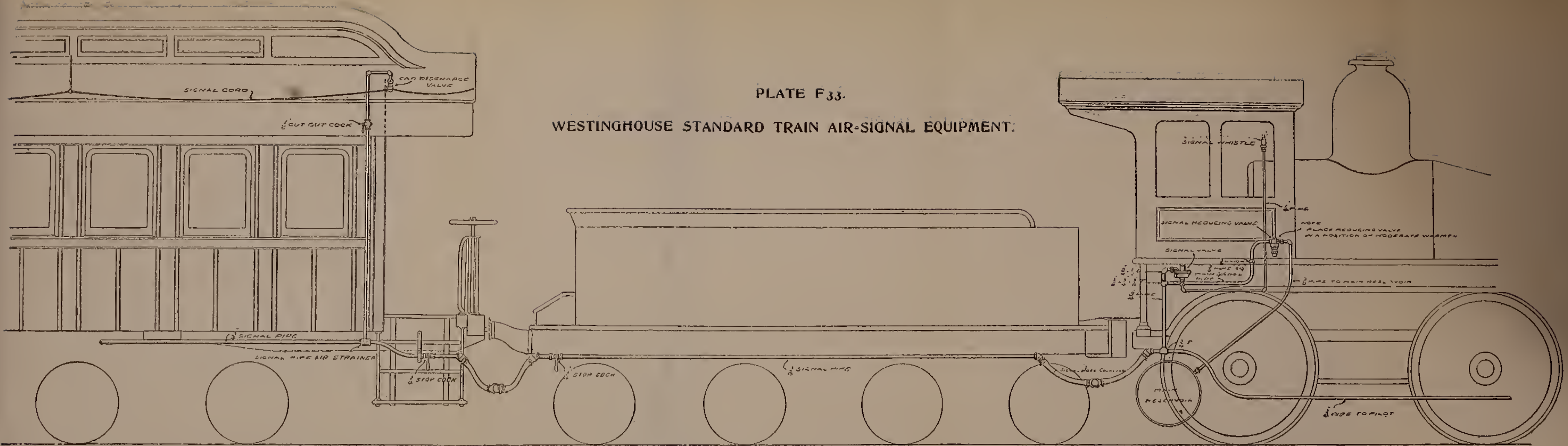


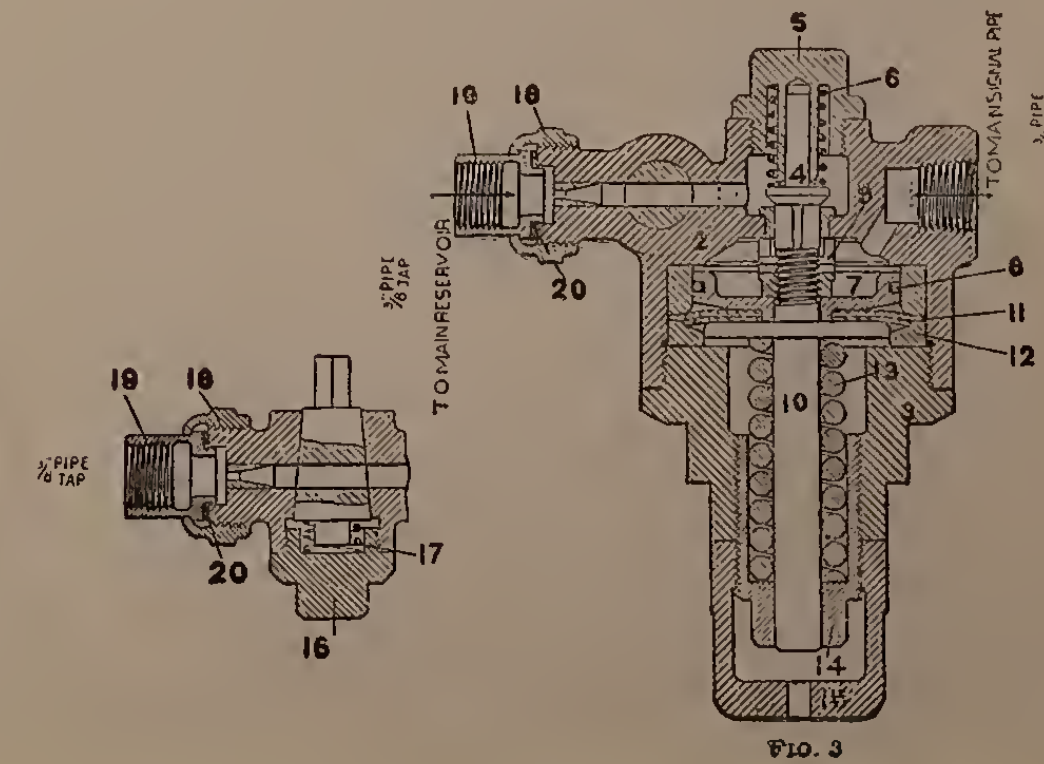
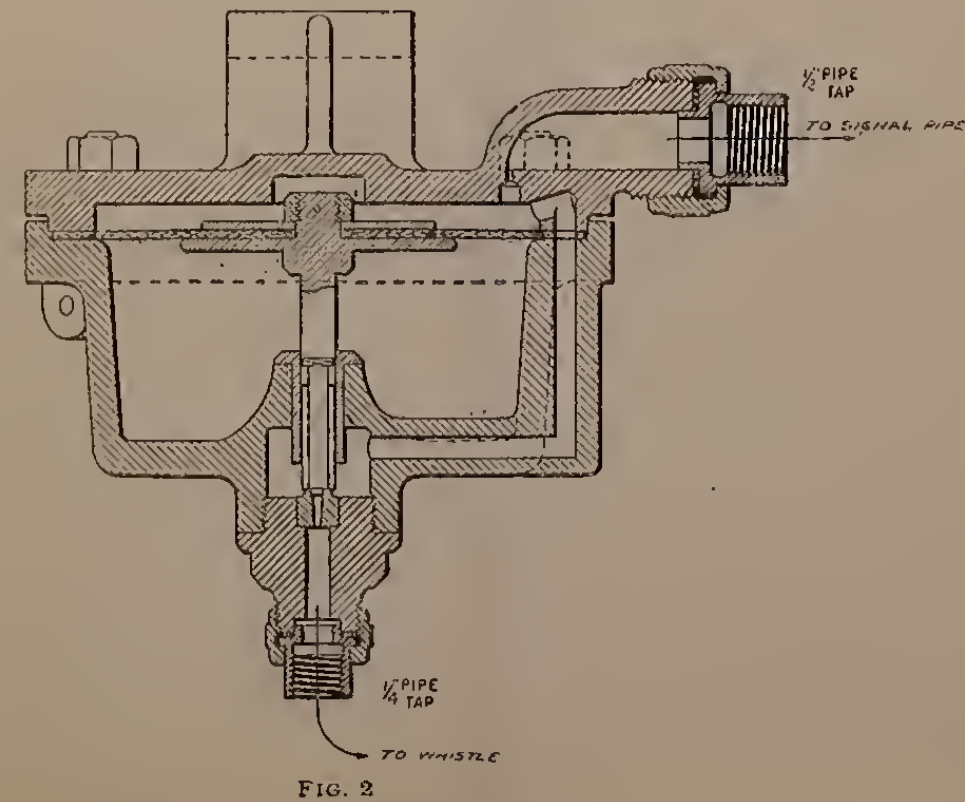
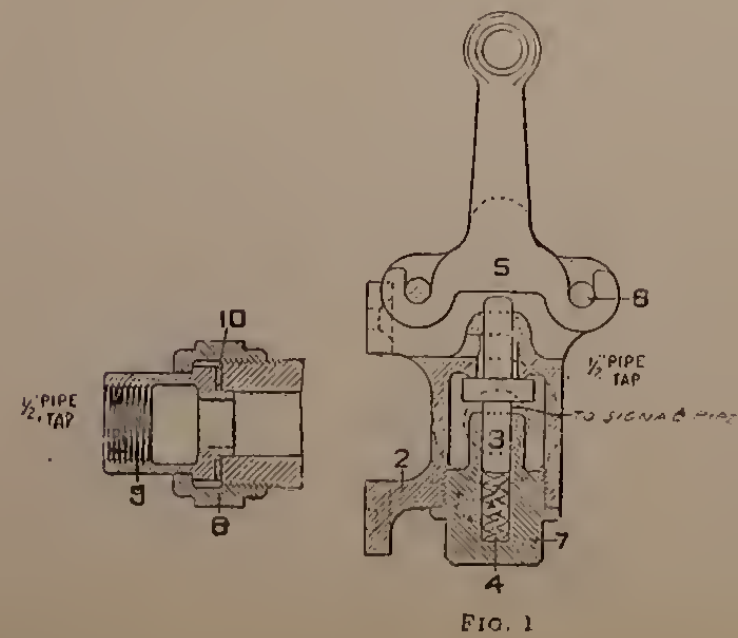


PLATE F33.

WESTINGHOUSE STANDARD TRAIN AIR-SIGNAL EQUIPMENT.



NOTE: THE ABOVE DIAGRAM IS SIMPLY ILLUSTRATIVE OF THE METHOD OF ARRANGING THE COMPRESSED AIR TRAIN SIGNALING APPLIANCES, AND MAY BE MODIFIED AS THE CONSTRUCTION OF THE CARS DEMANDS.





## PLATE F 33.

### STANDARD TRAIN AIR-SIGNAL APPARATUS.

FIG. 1.

**Car Discharge Valve, complete.**

- |     |                         |
|-----|-------------------------|
| No. |                         |
| 2.  | Discharge-Valve Body.   |
| 3.  | Discharge-Valve Stem.   |
| 4.  | Discharge-Valve Spring. |
| 5.  | Discharge-Valve Handle. |
| 6.  | Stop Pin.               |
| 7.  | Cap Nut.                |
| 8.  | Union Nut.              |
| 9.  | Union Swivel.           |
| 10. | Union Gasket.           |

FIG. 2.

**Signal Valve, complete.**

FIG. 3.

**\*Improved Reducing Valve, complete.**

- |     |   |
|-----|---|
| No. |   |
| 2.  | Reducing-Valve Body (bushed).           |
| 3.  | Spring Box.                             |
| 4.  | Supply Valve.                           |
| 5.  | Supply-Valve Cap Nut.                   |
| 6.  | Supply-Valve Spring.                    |
| 7.  | Reducing-Valve Piston (includes No. 8). |

- |     |                         |
|-----|-------------------------|
| 8.  | Piston Packing Ring     |
| 9.  | Piston Nut.             |
| 10. | Piston Rod.             |
| 11. | Diaphragm (two pieces). |
| 12. | Diaphragm Ring          |
| 13. | Regulating Spring.      |
| 14. | Regulating Nut.         |
| 15. | Check Nut.              |
| 16. | Cock Cap Nut.           |
| 17. | Cock Spring.            |
| 18. | Union Nut.              |
| 19. | Union Swivel.           |
| 20. | Union Gasket.           |

\*The improved Reducing Valve is adjusted to govern Train Signal-Pipe Pressure AT A MAXIMUM OF 40 POUNDS PER SQUARE INCH, and any necessary readjustment must be made for that pressure in order to secure the best results.

FIG. 4.

**Signal Whistle, complete.**

PLATE G 34. DETAIL PARTS OF TRAIN AIR-SIGNAL APPARATUS.



Fig. 1.

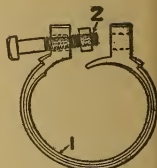


Fig. 3.



Fig. 2.



Fig. 4.



Fig. 5.

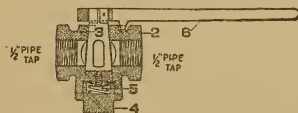


Fig. 6.

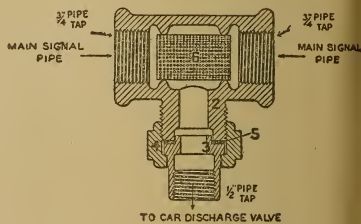


Fig. 7.

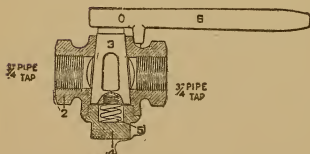


Fig. 8.



Fig. 9.



## PLATE G<sub>34</sub>.

### DETAIL PARTS OF TRAIN AIR-SIGNAL APPARATUS.

FIG. 1.

**Standard Signal Hose and Coupling, complete.**

One-inch Hose, 22 inches long with fittings for  $\frac{3}{4}$ -inch pipe.

FIG. 2.

**Standard Signal Hose Coupling, complete (order in pairs).**

No.

1. Signal Hose-Coupling Case.
2. Signal Hose - Coupling Packing Ring.

FIG. 3.

**Signal Hose Clamp, complete.**

No.

1. Signal Hose-Clamp Body.
2. Signal Hose-Clamp Bolt.

FIG. 4.

**One-inch by Three-fourths inch Hose Nipple.**

FIG. 5.

**Three-fourths inch Angle Fitting.**

FIG. 6.

**One-half inch Cut-out Cock, complete.**

No.

2. Cock Body.
3. Cock Key.
4. Cock Cap.
5. Key Spring.
6. Cock Handle.

FIG. 7.

**Three-fourths inch Signal-Pipe Air Strainer, complete.**

No.

2. Strainer Body.
3. Union Swivel.
4. Union Nut.
5. Union Gasket.
6. Strainer.

FIG. 8.

**Three-fourths inch Cock, complete.**

No.

2. Cock Body.
3. Cock Key.
4. Cock Cap.
5. Key Spring.
6. Cock Handle.

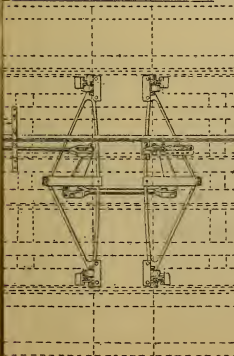
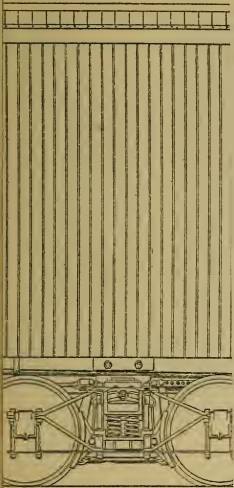
FIG. 9.

**Signal Dummy Coupling.**

PLATE G 35.

Westinghouse Standard Freight Car Brake  
Equipment.—*Opposite.*

AR BRAKE EQUIPM

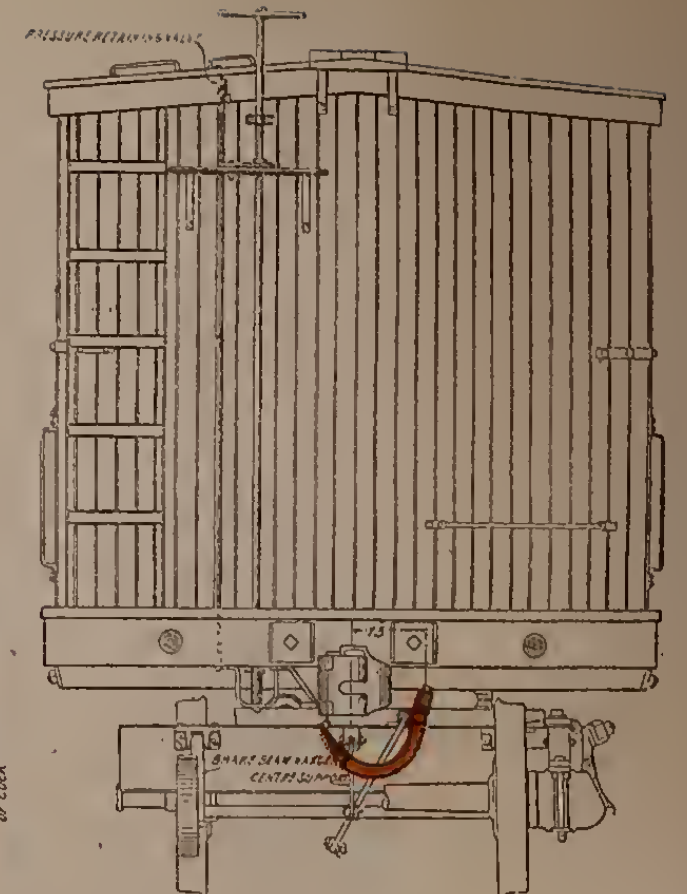
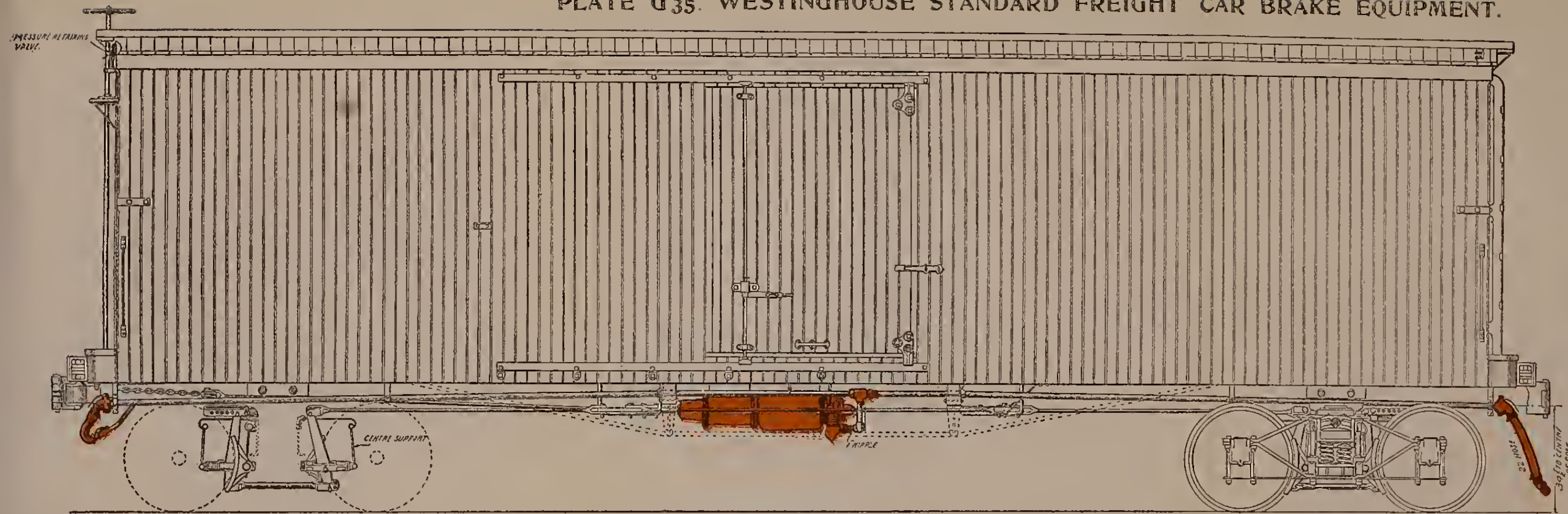


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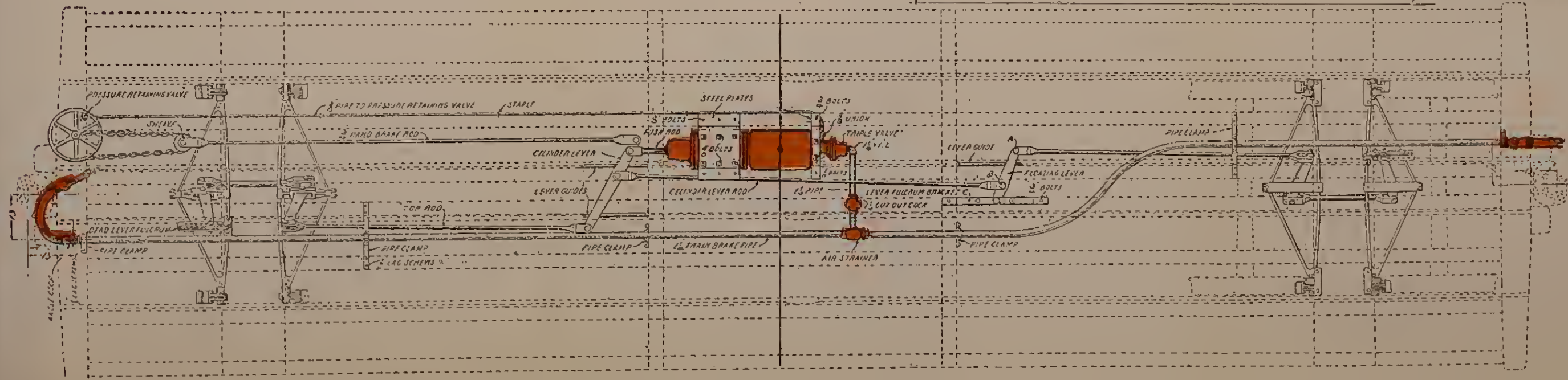
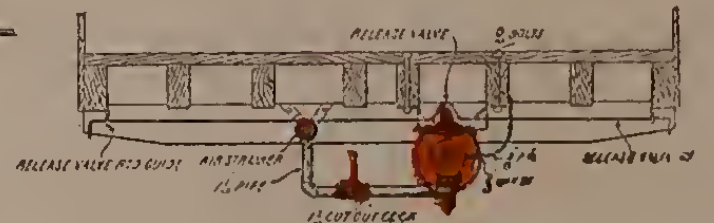
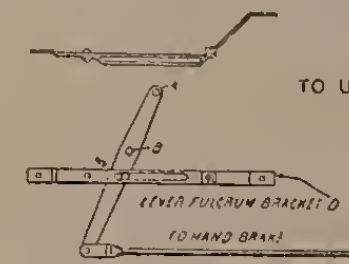
# PLATE G 35. WESTINGHOUSE STANDARD FREIGHT CAR BRAKE EQUIPMENT.



## IMPORTANT SUGGESTIONS.

ALL BRAKE RODS, PINS, AND LEVERS ILLUSTRATED ARE M. C. B. STANDARD SIZES, AND NO DEVIATION THEREFROM SHOULD BE PERMITTED. IN PIPING, ELBS SHOULD NOT BE USED WHERE PRACTICABLE TO EMPLOY BENDS INSTEAD. REMOVE FINS CAREFULLY, BLOW OUT PIPES WITH STEAM, AND ATTACH FIRMLY TO CAR TIMBERS BY MEANS OF HEAVY CLAMPS. USE NO LEAD INSIDE OF SOCKETS; IF NEEDED, APPLY SPARINGLY ON OUTSIDE, AND TEST ALL CONNECTIONS UNDER PRESSURE WITH SOAPSUDS.

ALTERNATIVE ARRANGEMENT WHEN IT IS DESIRED TO USE HAND BRAKE ON BOTH ENDS OF THE CAR.



## EXPLANATION OF TINTS.

STANDARD QUICK-ACTION AUTOMATIC BRAKE APPARATUS FURNISHED WITH COMPLETE FREIGHT-CAR EQUIPMENTS—"SCHEDULE H-1"—SHOWN IN ORANGE TINT.

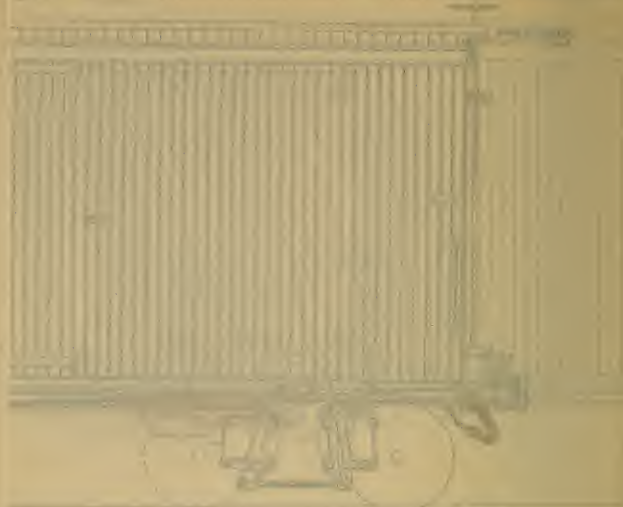


Fig. 1. A. S. Westinghouse Co. Patent, U. S. Pat. No. 1,121,111. This is a diagram of a motor or generator, showing the internal components and structure. The machine has a large, rectangular frame with vertical bars or ribs. Below the frame, there are two large, circular components, possibly wheels or rotors, mounted on a base. The drawing is a detailed cross-section or side view, showing the internal wiring and mechanical parts.

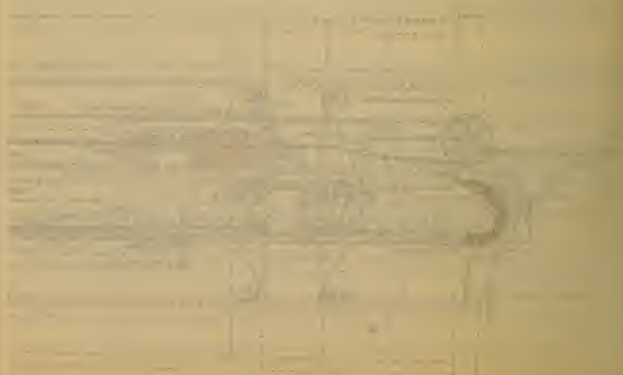
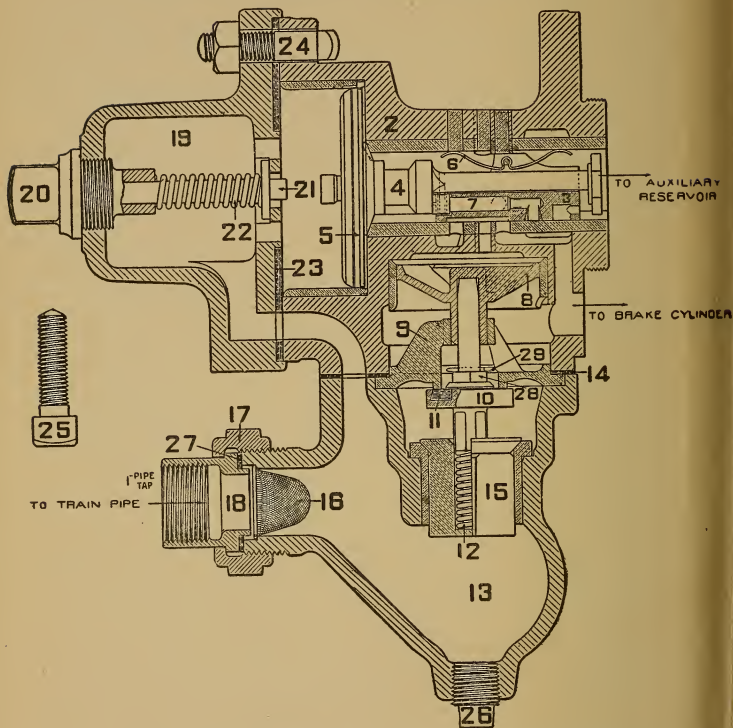






PLATE F 36. QUICK-ACTION FREIGHT TRIPLE VALVE.



NOTE.—"F 36" Triple Valves should be used in connection with the following apparatus only:  
 Freight-Car Brake Cylinders, 8 inches and 8 inches in diameter.  
 High-Speed Tender-Brake Cylinders, 8 inches in diameter.

Though similar in appearance, this valve differs essentially from both the Passenger Triple Valves, and should never be employed except as specified. It may be distinguished from the "F 27" and "F 29" Quick-Action Triples by the fact that it has TWO exhaust outlets (one of which is plugged), and also by the bore of its Slide-Valve Bush, which is 1 1/4 inches in diameter.

## PLATE F 36.

### QUICK-ACTION FREIGHT TRIPLE VALVE.

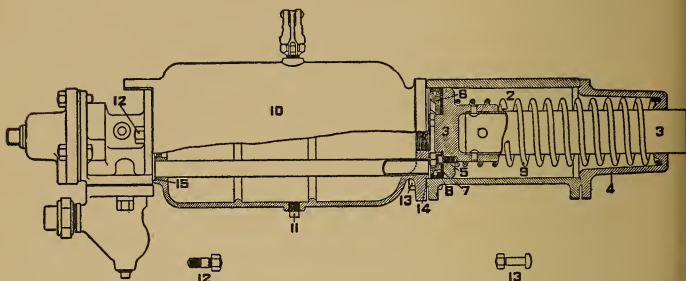
#### No. 1. "F 36" Quick-Action Freight Triple Valve, complete.

No.		No.	
2.	Triple-Valve Body (bushed).	17.	Union Nut.
3.	Slide Valve.	18.	Union Swivel.
4.	Piston (includes No. 5).	19.	Cylinder Cap.
5.	Packing Ring.	20.	Graduating-Stem Nut.
6.	Slide-Valve Spring.	21.	Graduating Stem.
7.	Graduating Valve.	22.	*Graduating Spring.
8.	Emergency-Valve Piston.	23.	Cylinder-Cap Gasket.
9.	Emergency-Valve Seat.	24.	Bolt and Nut.
10.	Emergency Valve.	25.	Half-inch Cap Screw.
11.	Rubber Seat.	26.	Half-inch Plug.
12.	Check-Valve Spring.	27.	Union Gasket.
13.	Check-Valve Case.	28.	Emergency-Valve Nut.
14.	Check-Valve-Case Gasket.	29.	Cotter Pin.
15.	Check Valve.	30.	Plug for Exhaust Outlet.
16.	Strainer.		

\*GRADUATING SPRING SPECIFICATIONS: Forty-nine one thousandths ( $\frac{49}{1000}$ ) inches diameter, Nickel Steel "Piano" Wire; 16 coils; 2  $\frac{3}{4}$  inches free height;  $\frac{3}{8}$  inches inside diameter.

## PLATE F 37.

### NARROW-GAUGE FREIGHT-CAR BRAKE CYLINDER AND AUXILIARY RESERVOIR COMBINED, WITH "F 36" TRIPLE VALVE.



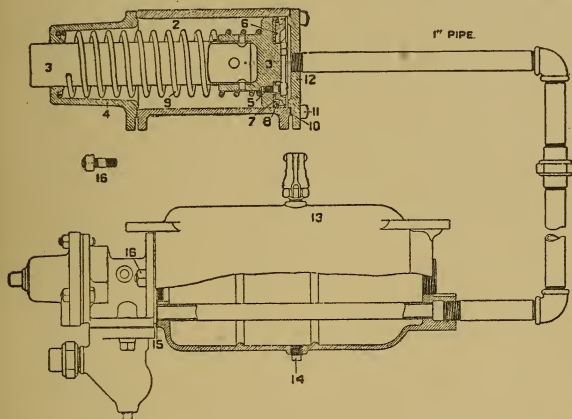
NOTE.—The "F 37" Brake Apparatus illustrated above is furnished with "Schedule H-4" for freight cars, the light weight of which does not exceed 15,000 pounds. The Brake Cylinder is 6 inches in diameter by 8 inches stroke.

#### No. 1. Narrow-Gauge Freight-Car Brake Cylinder and Auxiliary Reservoir Combined, with "F 36" Triple Valve, complete.

- |  |  |
|--|--|
| <p>No. 2. Cylinder Body.</p> <p>No. 3. Piston and Rod (includes Follower Studs and Nuts).</p> <p>No. 4. Non-Pressure Head.</p> <p>No. 5. Follower Stud and Nut.</p> <p>No. 6. Follower.</p> <p>No. 7. Packing Leather.</p> <p>No. 8. Packing Expander.</p> | <p>No. 9. Release Spring.</p> <p>No. 10. Reservoir (includes Nos. 11 and 12).</p> <p>No. 11. Drain Plug.</p> <p>No. 12. Reservoir Stud and Nut.</p> <p>No. 13. Cylinder-Head Bolt and Nut.</p> <p>No. 14. Cylinder Gasket.</p> <p>No. 15. Triple-Valve Gasket.</p> |
|--|--|

## PLATE F 38.

### NARROW-GAUGE FREIGHT-CAR BRAKE CYLINDER AND AUXILIARY RESERVOIR, DETACHED, WITH "F 36" TRIPLE VALVE.



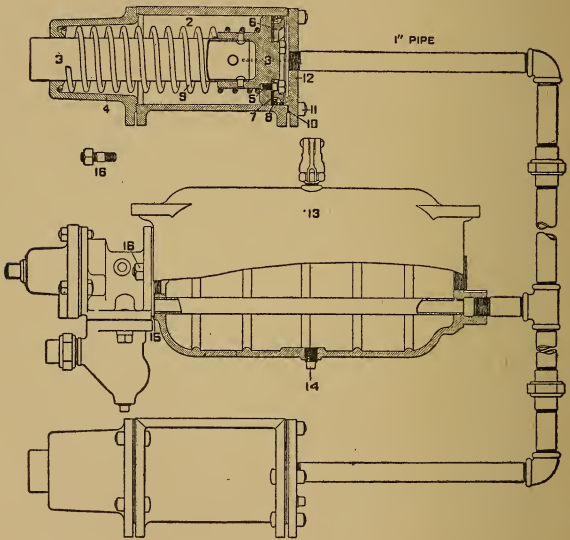
NOTE.—The "F 38" Brake Apparatus illustrated above is furnished with "Schedule H-5" for Freight Cars, the light weight of which does not exceed 15,000 pounds, but the construction of which prevents the application of the combined-cylinder-and-reservoir type of brake illustrated on Plate "F 37." The Brake Cylinder is 6 inches in diameter by 8 inches stroke.

### Narrow-Gauge Freight-Car Brake Cylinder and Auxiliary Reservoir Detached, with "F 36" Triple Valve, complete.

- |  |  |
|--|--|
| <p>No. 1. Brake Cylinder, complete.</p> <p>No. 2. Cylinder Body.</p> <p>No. 3. Piston and Rod (includes Follower Studs and Nuts).</p> <p>No. 4. Back Head.</p> <p>No. 5. Follower Stud and Nut.</p> <p>No. 6. Follower.</p> <p>No. 7. Packing Leather.</p> <p>No. 8. Packing Expander.</p> | <p>No. 9. Release Spring.</p> <p>No. 10. Cylinder Gasket.</p> <p>No. 11. Cylinder-Head Bolt and Nut.</p> <p>No. 12. Pressure Head.</p> <p>No. 13. Special Auxiliary Reservoir (includes Nos. 14 and 16).</p> <p>No. 14. Drain Plug.</p> <p>No. 15. Triple-Valve Gasket.</p> <p>No. 16. Reservoir Stud and Nut.</p> |
|--|--|

## PLATE F39.

**"TWIN-CYLINDER" FREIGHT-CAR BRAKE APPARATUS WITH AUXILIARY  
RESERVOIR DETACHED, AND "F36" TRIPLE VALVE.**



NOTE.—The "F 39" Brake Apparatus illustrated above is furnished with "Schedule H-6" for freight cars, the weight and construction of which prevents the use of a single-cylinder brake, either of the combined or detached type. Each of the cylinders illustrated is 6 inches in diameter by 8 inches stroke.

## PLATE F39.

### "TWIN-CYLINDER" FREIGHT-CAR BRAKE APPARATUS WITH AUXILIARY RESERVOIR DETACHED, AND "F36" TRIPLE VALVE.

---

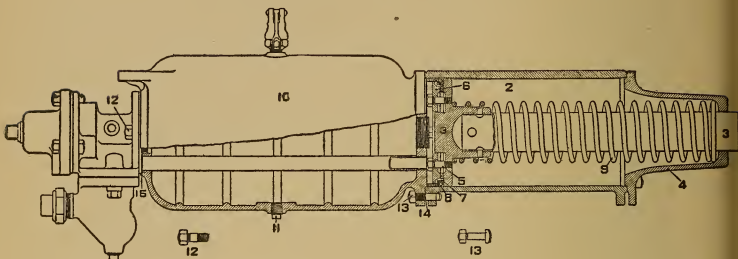
#### "Twin-Cylinder" Freight-Car Brake Apparatus with Auxiliary Reservoir Detached, and "F36" Triple Valve, complete.

- |   |  |
|---|--|
| No.   | No.  |
| 1. Brake Cylinder, complete.                          | 9. Release Spring.   |
| 2. Cylinder Body.                                     | 10. Cylinder Gasket.                                       |
| 3. Piston and Rod (includes Follower Studs and Nuts). | 11. Cylinder-Head Bolt and Nut.                            |
| 4. Non-Pressure Head.                                 | 12. Pressure Head.   |
| 5. Follower Stud and Nut                              | 13. Special Auxiliary Reservoir (includes Nos. 14 and 16). |
| 6. Follower.  | 14. Drain Plug.  |
| 7. Packing Leather.                                   | 15. Triple-Valve Gasket.                                   |
| 8. Packing Expander.                                  | 16. Reservoir Stud and Nut.                                |



## PLATE F 40.

### STANDARD FREIGHT-CAR BRAKE CYLINDER AND AUXILIARY RESERVOIR COMBINED, WITH "F 36" TRIPLE VALVE.



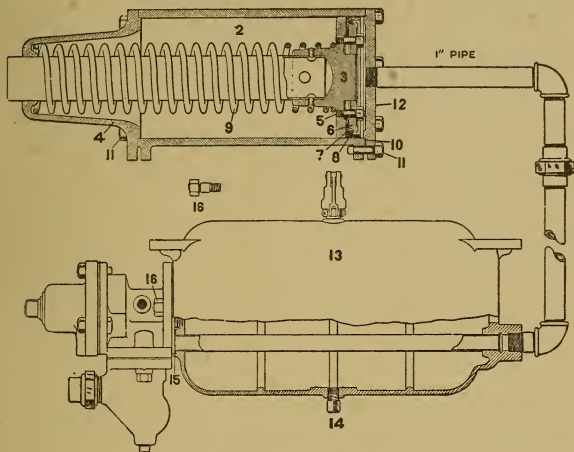
NOTE.—The "F 40" Brake Apparatus illustrated above is furnished with "Schedule H-1" for freight cars, the light weight of which exceeds 15,000 pounds. The brake cylinder is 8 inches in diameter by 12 inches stroke. Together with the additional fixtures included in "Schedule H-1," it constitutes the Standard Automatic-Brake Equipment for Freight Cars.

#### No. 1. Standard Freight-Car Brake Cylinder and Auxiliary Reservoir Combined, with "F 36" Triple Valve, complete.

- |   |   |
|---|---|
| <p>No.</p> <p>2. Cylinder Body.</p> <p>3. Piston and Rod (includes Follower Studs and Nuts).</p> <p>4. Non-Pressure Head.</p> <p>5. Follower Stud and Nut.</p> <p>6. Follower.</p> <p>7. Packing Leather.</p> <p>8. Packing Expander.</p> <p>9. Release Spring.</p> | <p>No.</p> <p>10. Reservoir (includes Nos. 11 and 12).</p> <p>11. Drain Plug.</p> <p>12. Reservoir Stud and Nut.</p> <p>13. Cylinder-Head Bolt and Nut.</p> <p>14. Cylinder Gasket.</p> <p>15. Triple Valve Gasket.</p> |
|---|---|

## PLATE F 41.

### STANDARD FREIGHT-CAR BRAKE CYLINDER AND AUXILIARY RESERVOIR DETACHED, WITH "F 36" TRIPLE VALVE.



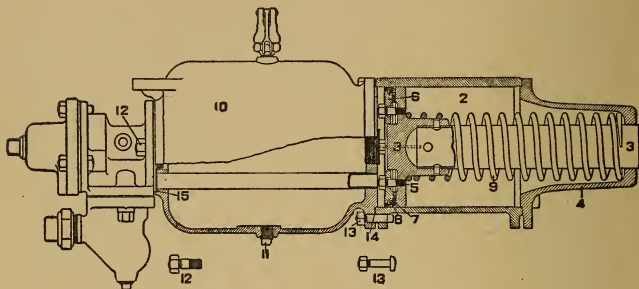
NOTE.—The "F 41," Brake Apparatus illustrated above is furnished with "Schedule H-2" for freight cars, the light weight of which exceeds 15,000 pounds, but the construction of which prevents the application of the combined-cylinder-and-reservoir type of brake illustrated on Plate "F 40." The brake cylinder is 8 inches in diameter by 12 inches stroke.

### Standard Freight-Car Brake Cylinder and Auxiliary Reservoir Detached, with "F 36" Triple Valve, complete.

No.		No.	
1.	Brake Cylinder, complete.	9.	Release Spring.
2.	Cylinder Body.	10.	Cylinder Gasket.
3.	Piston and Rod (includes Follower Studs and Nuts)	11.	Cylinder-Head Bolt and Nut.
4.	Non-Pressure Head.	12.	Pressure Head.
5.	Follower Stud and Nut.	13.	Special Auxiliary Reservoir (in- cludes Nos. 14 and 16)
6.	Follower.	14.	Drain Plug.
7.	Packing Leather.	15.	Triple-Valve Gasket.
8.	Packing Expander.	16.	Reservoir Stud and Nut.

PLATE F 42.

**SHORT-STROKE FREIGHT-CAR BRAKE CYLINDER AND AUXILIARY RESERVOIR  
COMBINED, WITH "F<sub>36</sub>" TRIPLE VALVE.**



NOTE.—The "F 42" Brake Apparatus illustrated above is furnished with "Schedule H-3" for freight cars of medium weight to which a combined cylinder and reservoir of greater length cannot be successfully applied. The brake cylinder is 8 inches in diameter by 8 inches stroke.

**No. 1. Short-Stroke Freight-Car Brake Cylinder and Auxiliary Reservoir Combined, with "F36" Triple Valve, complete.**

- |   |  |
|---|--|
| No.   | No.                                      |
| 2. Cylinder Body.                                     | 9. Release Spring.                       |
| 3. Piston and Rod (includes Follower Studs and Nuts). | 10. Reservoir (includes Nos. 11 and 12). |
| 4. Non-Pressure Head.                                 | 11. Drain Plug.                          |
| 5. Follower Stud and Nut.                             | 12. Reservoir Stud and Nut.              |
| 6. Follower.  | 13. Cylinder-Head Bolt and Nut.          |
| 7. Packing Leather.                                   | 14. Cylinder Gasket.                     |
| 8. Packing Expander.                                  | 15. Triple-Valve Gasket.                 |



PLATE G 43. DETAIL PARTS OF STANDARD FREIGHT-CAR BRAKE APPARATUS.



Fig. 1.



Fig. 3.

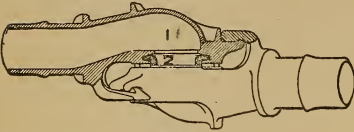


Fig. 2.

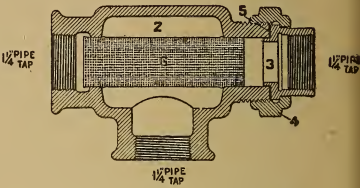


Fig. 4.

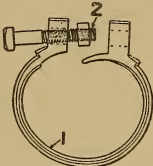


Fig. 5.

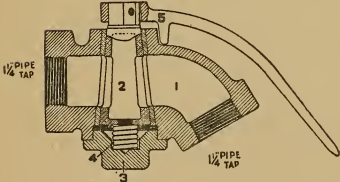


Fig. 6.

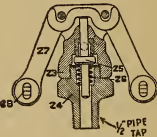


Fig. 8.

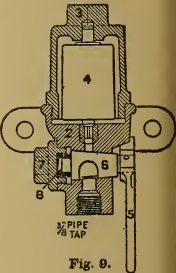


Fig. 9.

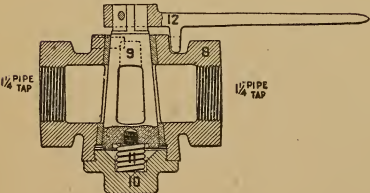


Fig. 7.



Fig. 10.



Fig. 11.

## PLATE G 43.

### DETAIL PARTS OF STANDARD FREIGHT-CAR BRAKE APPARATUS.

FIG. 1.

**Standard One and One-quarter inch Hose and Coupling, complete.**

Hose 22 inches long (order in pairs.)

FIG. 2.

**Standard One and One-quarter inch Hose Coupling (order in pairs).**

No.

1. One and One-quarter inch Hose Coupling Case.
2. One and One-quarter inch Hose Coupling Packing Ring.

FIG. 3.

**One and One-quarter inch Hose Nipple.**

FIG. 4.

**One and One-quarter inch Brake-Pipe Air Strainer, complete.**

No.

2. Strainer Body.
3. Union Swivel.
4. Union Nut.
5. Union Gasket.
6. Strainer.

FIG. 5.

**One and One-quarter inch Hose Clamp, complete.**

No.

1. One and One-quarter inch Hose Clamp.
2. One and One-quarter inch Hose Clamp Bolt.

FIG. 6.

**One and One-quarter inch Angle Cock, complete.**

No.

1. Angle-Cock Body.
2. Angle-Cock Key.
3. Angle-Cock Cap.
4. Angle-Cock Spring.
5. Angle-Cock Handle.

FIG. 7.

**One and One-quarter inch Cut-out Cock, complete.**

No.

8. Cock Body.
9. Cock Key.
10. Cock Cap.
11. Key Spring.
12. Cock Handle.

FIG. 8.

**Release Valve, complete.**

No.

23. Release-Valve Cylinder.
24. Release-Valve Stud.
25. Vent Valve.
26. Release-Valve Spring.
27. Release-Valve Handle.
28. Release-Valve Pin.

FIG. 9.

**Improved Pressure - Retaining Valve, complete.**

No.

2. Retaining-Valve Body (includes Nos. 5, 6, 7, and 8).
3. Retaining-Valve Case.
4. Retaining-Valve Weight.
5. Retaining-Valve Handle.
6. Retaining-Valve-Cock Key.
7. Retaining-Valve-Cock Cap.
8. Retaining-Valve-Cock Spring.

FIG. 10.

**Coupling-Groove Cleaning Tool.**

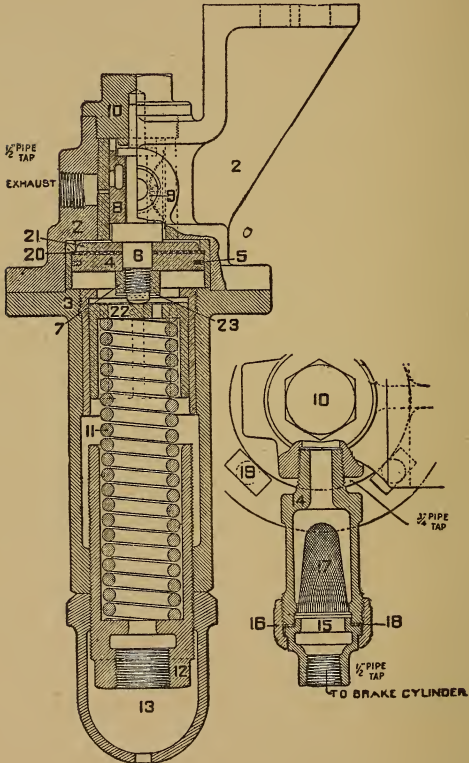
FIG. 11.

**One and One-quarter inch Dummy Coupling.**

# PLATE F 45.

## HIGH-SPEED BRAKE AUTOMATIC REDUCING VALVE

1898 PATTERN.





## PLATE F 45.

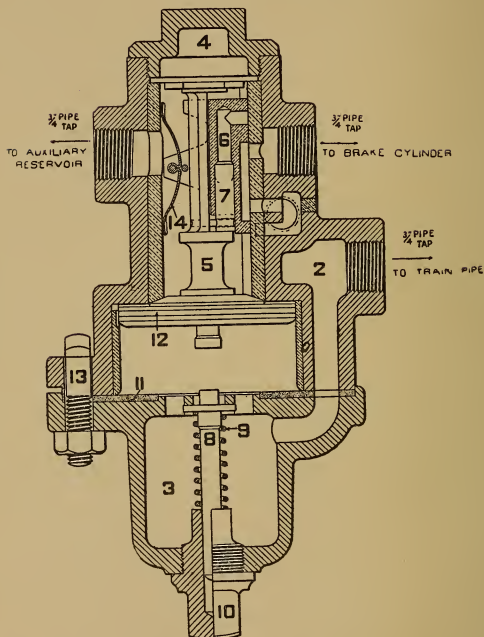
### HIGH-SPEED BRAKE AUTOMATIC REDUCING VALVE.

#### No. 1. High-Speed Brake Automatic Reducing Valve, complete.

No.		No.	
2.	Valve Body.	13.	Check Nut.
3.	Spring Box.	14.	Union Stud.
4.	Valve Piston (includes No. 5).	15.	Union Swivel.
5.	Packing Ring.	16.	Union Nut.
6.	Piston Stem.	17.	Union Strainer.
7.	Piston-Stem Nut	18.	Union Gasket.
8.	Slide Valve.	19.	Bolt and Nut.
9.	Slide-Valve Spring.	20.	Leather Washer.
10.	Cap Nut.	21.	Piston Disc.
11.	Regulating Spring.	22.	Spring Abutment.
12.	Regulating Nut.	23.	Cotter Pin.

# PLATE F46.

## HIGH-SPEED PLAIN TRIPLE VALVE.



NOTE.—This Triple Valve is designed specially for use in combination with other High-Speed Brake Appliances, for operating both Driver and Engine-Truck Brakes, and must not be used for other purposes,

## PLATE F46.

### HIGH-SPEED PLAIN TRIPLE VALVE.

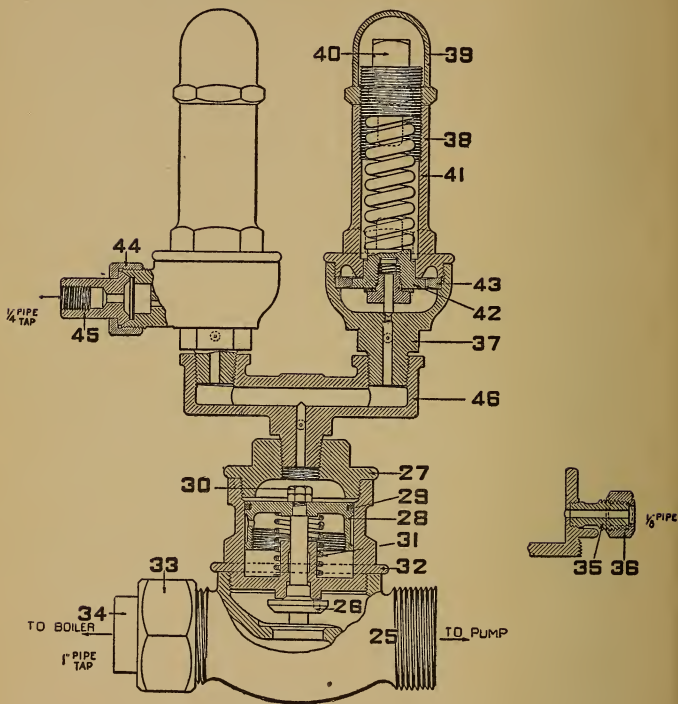
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#### No. 1. High-Speed Plain Triple Valve, complete.

No.		No.	
2.	Triple-Valve Body (bushed)	9.	Graduating Spring.
3.	Cylinder Cap.	10.	Graduating-Stem Nut.
4.	Cap Nut.	11.	Cylinder Cap Gasket.
5.	Piston (includes No. 12).	12.	Packing Ring.
6.	Slide Valve.	13.	Bolt and Nut.
7.	Graduating Valve.	14.	Slide-Valve Spring.
8.	Graduating Stem.		

\*GRADUATING SPRING SPECIFICATIONS: Phospor-Bronze Spring Wire, No. 14 B. W. G.  
11/16 inches in diameter, 12 coils, 2 1/2 inches free height; 1 1/4 inches inside diameter.

PLATE F 47. DUPLEX PUMP GOVERNOR.



The diaphragm portion of this Governor at the right is adjusted to govern the 110-lb. pressure, and the one at the left the 90-lb. pressure for ordinary braking. A 1/4-inch Out-out Cock must be used in the pipe attached to fitting 45 (see Plate "G 50") of the low-pressure diaphragm, and must be closed when operating the High-Speed Brake.

## PLATE F 47.

### DUPLEX PUMP GOVERNOR.

---

#### No. 1. Duplex Pump Governor, complete.

No.		No.	
25.	Steam-Valve Body.	36.	Waste-Pipe Union Nut.
26.	Steam Valve.	37.	Diaphragm Body.
27.	Cylinder Cap.	38.	Spring Box.
28.	Governor Piston (includes No. 29).	39.	Cap Nut.
29.	Piston Packing Ring.	40.	Regulating Nut.
30.	Governor-Piston Nut.	41.	Regulating Spring.
31.	Governor-Piston Spring.	42.	Diaphragm, complete.
32.	Steam-Valve Cylinder (includes Nos. 35 and 36).	43.	Diaphragm Ring.
33.	One-inch Union Nut.	44.	Union Nut.
34.	One-inch Union Swivel.	45.	Union Swivel.
35.	Waste-Pipe Stud.	46.	Siamese Fitting.

# PLATE F48.

DETAIL PARTS OF HIGH-SPEED BRAKE AND HIGH-PRESSURE CONTROL APPARATUS.

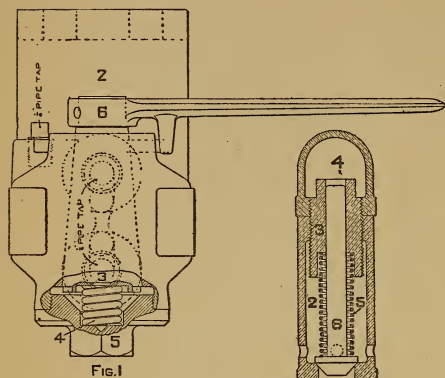


Fig. 1

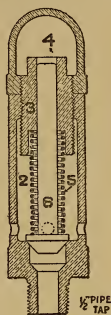


Fig. 2.

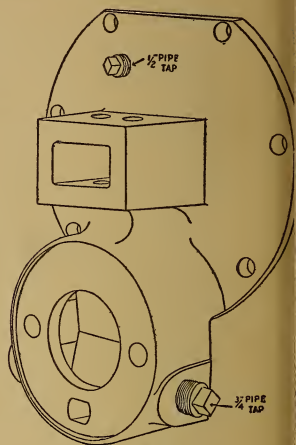


Fig. 4

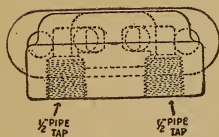


Fig. 3.

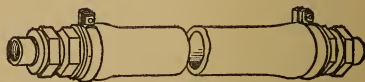


Fig. 6.



FIG. 5'

L. of C.

## PLATE F 48.

### DETAIL PARTS OF HIGH-SPEED BRAKE AND HIGH PRESSURE CONTROL APPARATUS.

FIG. 1.

Feed-Valve Bracket with Reversing  
Cock, complete.

No.

2. Reversing-Cock Body.
3. Reversing-Cock Key.
4. Reversing-Cock Spring.
5. Reversing-Cock Cap.
6. Reversing-Cock Handle.

FIG. 2.

Safety Valve, complete.

No.

2. Safety-Valve Body.
3. Regulating Nut.
4. Cap Nut.
5. Regulating Spring.
6. Valve.

FIG. 3.

Feed-Valve Pipe Bracket.

FIG. 4.

Tender - Cylinder Head for Quick-  
Action Triple Valve with Slack-  
Adjuster Lug.

FIG. 5.

One-fourth inch Cock.

FIG. 6.

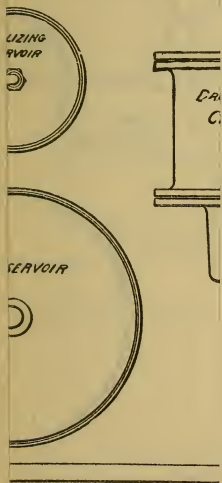
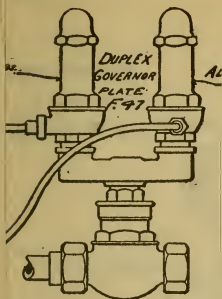
Flexible Hose Connection with Fit-  
tings for Half-inch Pipe.



PLATE G 49.

Diagrammatic Illustration of Westinghouse High  
Pressure Control Apparatus.—*Opposite.*

# USE HIGH PRES



**EXPLANATION.**  
 INSTALLATION OF THE APPARA  
 NDARD BRAKE EQUIPMENT O.  
 SCHEDULE U," AND THE DEV

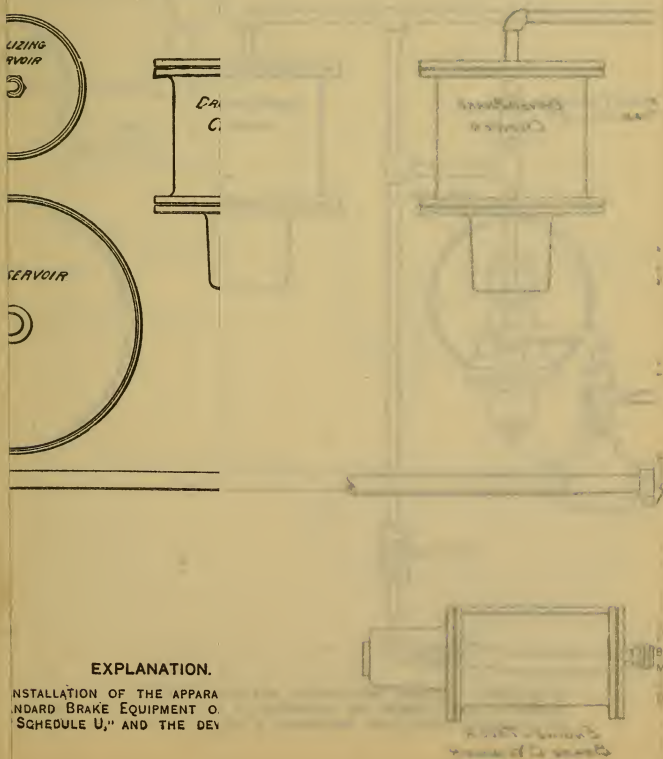
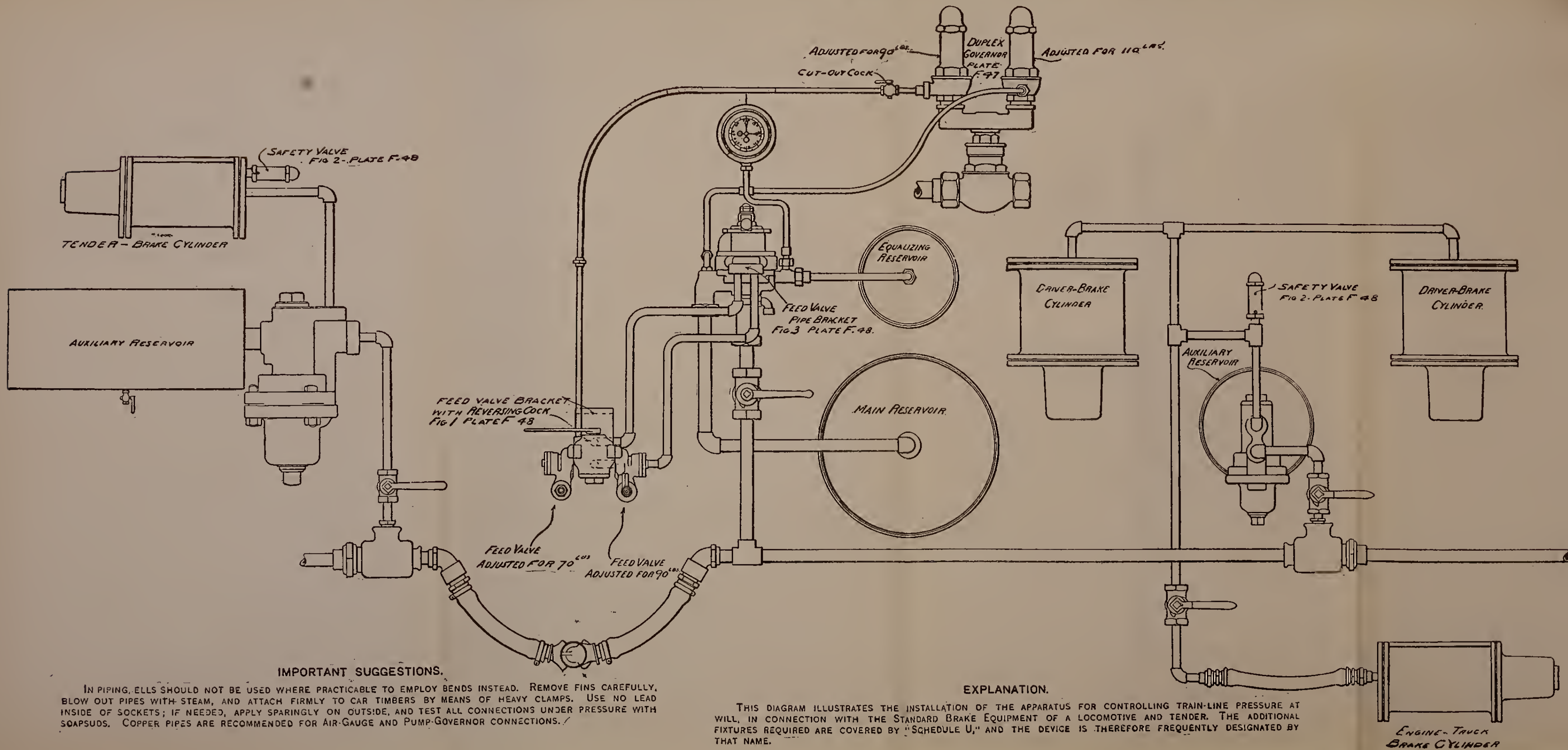




PLATE G 49. DIAGRAMATIC ILLUSTRATION OF WESTINGHOUSE HIGH PRESSURE CONTROL APPARATUS.



BOARD OF SUPERVISORS AND RECOMMENDATION FOR AIRCRAFT WITH FUELING  
 WHICH ARE DESIGNED TO BE USED IN AIRCRAFT AND RECOMMENDATION FOR  
 BOARD OF SUPERVISORS WITH STEAM AND RECOMMENDATION FOR AIRCRAFT  
 IN WHICH CASES SHOULD NOT BE USED WHERE PRACTICABLE TO EMPLOY

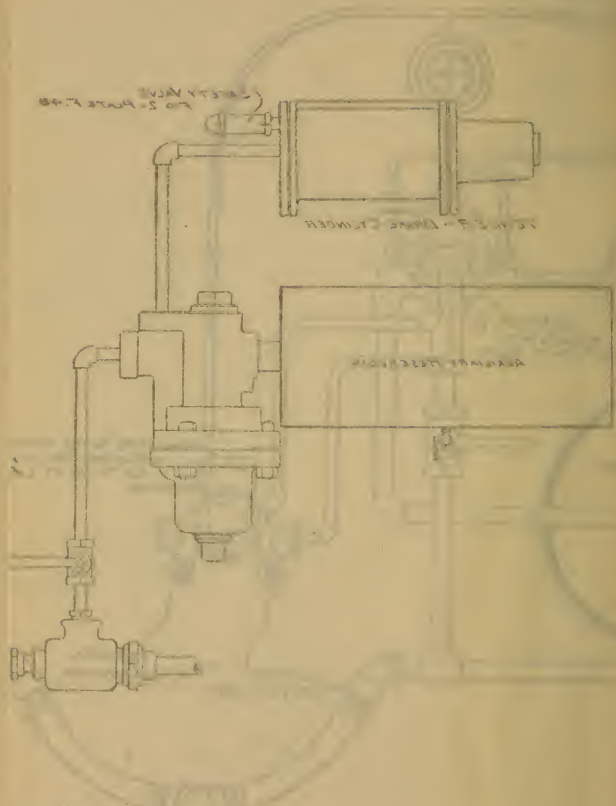




PLATE G 50.

Diagrammatic Illustration of the Westinghouse  
Standard High Speed Brake.—*Opposite.*





ADJUSTED FOR 110 <sup>lbs</sup>

## ENGINE

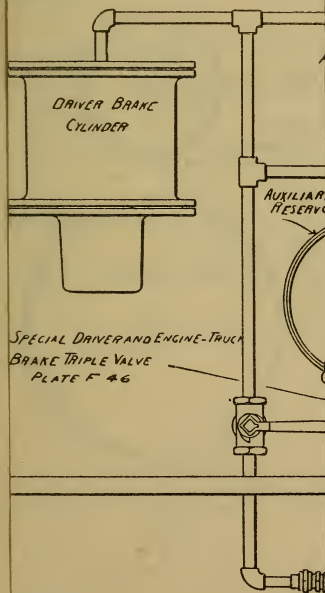
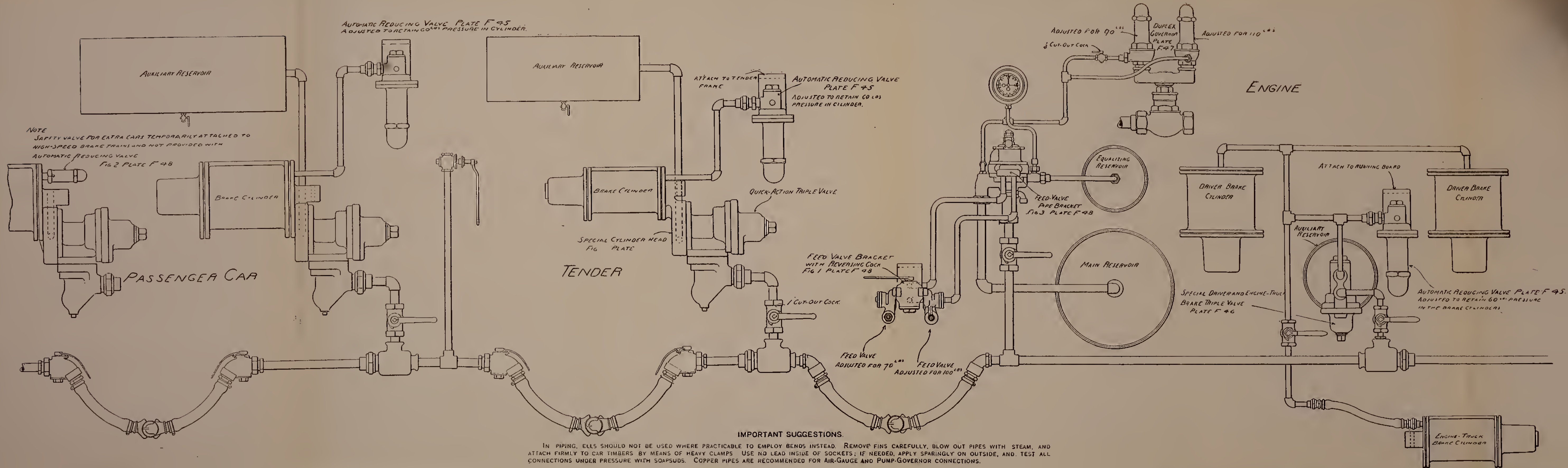




PLATE G50. DIAGRAMATIC ILLUSTRATION OF THE WESTINGHOUSE STANDARD HIGH SPEED BRAKE.





Mar. 4, 1902.

MAR 3 1902

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